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THE PAN-PACIFIC ENTOMOLOGIST

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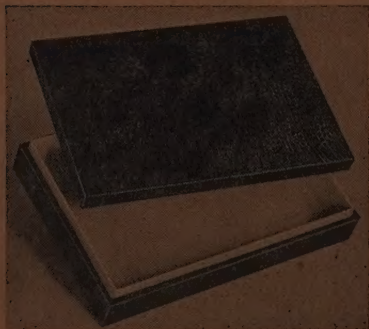
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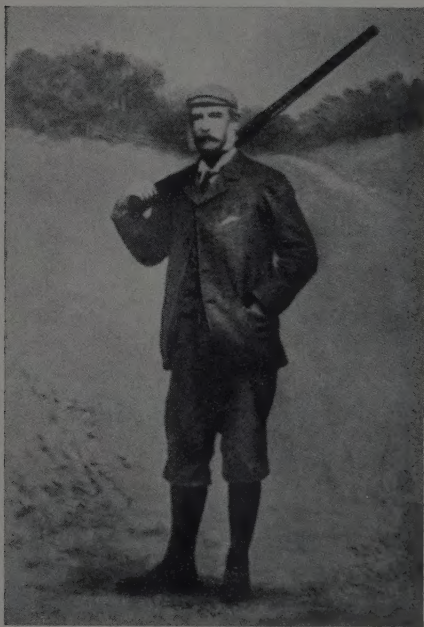
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THOMAS DE GREY, D.L., F.R.S., F.E.S., etc., Sixth Baron Walsingham (1843-1919), a lepidopterist of note and one of the greatest figures in the history of shooting in the British Empire. (From his book "Hit or Miss" by Phillip Allan.)

The Pan-Pacific Entomologist

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July, 1941

ITINERARY OF LORD WALSINGHAM IN CALIFORNIA AND OREGON, 1871—1872

BY E. O. ESSIG

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Lord Walsingham is a name familiar to entomologists throughout much of the world. It is a very honored one in England where his Lordship lived. How it became important to entomology in North America and particularly to the Pacific coast is the purpose of this sketch. But before beginning our narrative, it might be well to briefly sketch his interesting career before he came to travel in this country in the years 1871 and 1872. He was educated at Eaton and Trinity College, Cambridge University, and had just finished a five-year term as Conservative M. P. for West Norfolk. He was at the time a member of the Entomological Society of London and a Trustee of the great British Museum. He had traveled extensively in the Old World and already had gained a reputation as an authority on the Microlepidoptera or smaller moths. He was but little known in eastern United States and was wholly a stranger to the Pacific coast. Here he had come for the express purpose of collecting moths to add to his collections. He was very successful in his quest and returned home with a large number of specimens most of which he later described as new species from California and Oregon. Unfamiliar as he was in a relatively wild country, he was unable to give very accurate and detailed locality records for many of these western moths, and American entomologists who have studied his species have at times wished for more exact information concerning the localities from which they may have been taken.

Knowing that he had presented his magnificent collection of 50,000 specimens of Microlepidoptera to the British Museum of Natural History in 1910, I sought some information regarding his activities in western North America while I was engaged in research work at the Museum during the winter and spring of 1937. Fortunately, it was possible to consult with Mr. H. Stringer,

formerly associated with Lord Walsingham and then one of the keepers of the Walsingham collections. Among other things he showed me the diaries kept by Lord Walsingham and his esquarry, Amos Carrier. These diaries seemed to be of so much interest and importance to American zoölogists and especially to microlepidopterists that I asked permission to copy them. This was granted and longhand copies were made which are reproduced in this article.

These extracts are published by permission of the Trustees of the British Museum with the consent of the present Lord Walsingham.

In the late summer of 1871 the sixth Baron Walsingham arrived in San Francisco from England with an entourage for the purpose of exploring certain parts of northern California and Oregon for the collection of entomological and other zoölogical specimens to add to his large collections in Norfolk, England. He and his party had crossed the Atlantic by boat and traversed the United States via the newly constructed continental railway. They planned to continue by horseback and horse-drawn vehicles. In addition to his Lordship the party included Thomas Eedle, Amos Carrier, groom and author of the Carrier diary, Cater, Hiram Monts, Thomas Morton, trapper from Portuguese Flats, California, and Charley Morton, his son. The equipage consisted of saddle horses for riding and mules and wagon to haul provisions and equipment through the sparsely settled and wilderness areas through which the party was to pass. It appears that Lord Walsingham, probably accompanied by Thos. Eedle, left San Francisco on Friday, May 17, 1871, by train to Petaluma where they joined Amos Carrier and the equipage which were transported by boat. There are some discrepancies in the two diaries, but I am giving them just as they were written by Walsingham and Carrier. The accompanying maps, traced from the originals, give the locations of the camps by number as indicated in the text. Interpolations and additions by me are in brackets.

Unfortunately so far I have been unable to secure any information concerning the equipage of this expedition and very little other information has been available. The arrival of Lord Walsingham in San Francisco created little comment in the local press. However, the following items from San Francisco papers are worthy of note.

DAILY EVENING BULLETIN, vol. 32, Wednesday Evening, May 17, 1871¹.

"Earl de Grey's Invitation—The invitation to the recent reception of Earl de Grey, at Washington, consisted of a small card, with merely the words written upon it, 'Earl de Grey, at Home, Saturday, April 22, 9 P. M.' These a fellow carried around on horseback in a basket and we are having a violent discussion in town as to whether this originated in Earl de Grey's contempt for America socially, or whether it really is the nobby way, to be initiated by all hereafter. We have heard of cards at weddings before, but we never heard of no envelopes to the huge size pasteboard, and the gorgeous envelope this aristocratic Earl has dispensed with. I think it a good thing myself and could be further innovated on if the fellow on horseback would just take a list of the guests, and then ride up to the door of each, and give a yell like the charcoal man and milk fellow: it would be very simple, straightforward and democratic, and then it would have the further advantage of letting all your neighbors know that you have been invited out.—Donn Piatt."

SAN FRANCISCO NEWS LETTER AND ADVERTISER—May 13, 1871, p. 13.

"Entomological. Lord Walsingham and his associate savants will be received on their arrival in San Francisco by the California Lepidoptera Society, of which Dr. Behr, Dr. Behrens, Harry Edwards, and Julius Quinchard are the most distinguished members. Dr. Behr has a very large and valuable collection of the lepidoptera, embracing rare specimens from every part of the globe. Harry Edwards is also the owner of an extensive collection, both of which will, no doubt, be inspected by the British entomologist."

SAN FRANCISCO NEWS LETTER AND ADVERTISER—May 13, 1871, p. 8.

"When the Party of British entomologists shall arrive on their scientific mission for the inspection and classification of our California 'bugs,' it is to be hoped that they will take an early opportunity to move one of our San Francisco Jenkinsons of the 'Society Gossip' variety under the microscope."

SAN FRANCISCO NEWS LETTER AND CALIFORNIA ADVERTISER—May 27, 1871, p. 9.

The Town Crier

"Lord Walsingham, an accomplished bug sharp, is in California making a collection of insects and reptiles. He has already found a great number of nice little toadies."

¹ This is the day Earl de Grey left San Francisco on his tour through Northern California and Oregon. Apparently the Bulletin Staff did not know he was in town since I found no mention of him in that paper.

DAILY ALTA CALIFORNIA, Vol. XXIII, Saturday Morning, May 13, 1871.

Arrivals from England

"Lord Walsingham, a savant, whose careful studies in natural history have made him distinguished among scientific men of England, Lord Walter Campbell, the Hon. Mr. Laird, the Hon. M. Chaplin, and Mr. A. De Laski arrived overland last evening [Friday, May 12, 1871] and are stopping at the Grand Hotel."

WALSINGHAM DIARY

CARRIER DIARY

13. V. 1871. San Francisco—collected a few species at Rock Cliff House near San Francisco among growth of lupin and other shrubby plants on sand.

17. V. 1871. San Francisco—off at 1 via Petaluma (American Hotel).

18. V. 1871. Collected near Petaluma 6 a. m. *Gelechia* very abundant. 3 specimens set. Plume allied to *teucris*—1 specimen.

On way to Santa Rosa—*Bucculatrix* . . . cocoons abundant on wide-leaved evergreen oak [*Quercus agrifolia* Nee]. *Halias* (?) on same oak. *Lithocolletis*, *Tinea* (black sp.), *Laverna* ?? (a small sp.), *Phyllocnistis*? one pupa.

Camp 1. 18. V. 1871. Four miles south of Santa Rosa (13 miles from Petaluma). Shot 1 yellow lark, 1 woodspeck, 1 nut-hatch, 2 doves, 1 thrush (brown breast). Killed small snake.

Camp 2. 19. V. 1871. Russian River. Up early—shot 2 woods-pecks. Saw California quail. Start to pass Santa Rosa and get on as far as may be to good camp. Got a few things on road to Camp 2. Took *Bucculatrix* sp. common among plant pressed (labelled Camp 2. Bucc.).

17. V. 71 (Th.). [Thursday, May 17, 1871].² Left San Francisco and sailed to Petaluma [taking wagon, animals, supplies, and equipment].

19. V. 71 (F.). Camped near Santa Rosa.

² Explanatory notes in brackets by E. O. Essig.

Coleophora cases on leaves of bush (labelled Camp No. 2. Col.). Took a number of insects and some birds—killed but lost a humming bird. Killed dotterel, hawks, woodpeckers, etc., etc.

Camp 3. Dry Creek. 20-21. V.

1871. Shot several birds by road. Mis-directed to Geyser Springs and made a turn left instead of right. Found good camp and collecting ground. Stayed over Sunday. Shot a humming bird. They are easy to see—hard to shoot—hard to pick up—easy to miss.

21. V. 1871. Sunday. Windy, no collecting.

20-21, 1871. (S.-S.). Camped over Sunday.

22-23. V. 1871. Sonoma County, Cal. Off towards Cloverdale, but wishing to see the Geyser Springs on the way, sent the waggon on with Eedle and Carrier to camp past Cloverdale, while Cater and I, with net, pill-boxes and pistols only, rode over 15 or 20 miles by the old road from Geyserville to the springs—the most beautiful scenery I ever saw, but a road which would have been simply destructive to the waggon. Many moths flying, boxed a few including a good *Hypnomenuta*. Arrived at hotel and saw geyser—regular tourist haunt puffed by a penny peep-show—sort of a German landlord. Guide talked a good deal about the devil!

Camp 4. Near Pluton Creek [Pluto Creek].

22-3. V. 1871. Walsingham & Eedle.

23. V. 1871. Off at 5:30 by trail toward Cloverdale—trail mighty weak—lost it very often and wandered up and down enormous hills—in one place found a X for a sign-post marked with a "To the Geysers. Excuse twist—new road." It was a twist with a vengeance and as hard a bit of riding as I ever

22. V. 71. (M.). Left Healdsburg early on Monday morning. Travelled through Cloverdale—wanted bread, could not get any nor potatoes—travelled a long way before we could find a place to camp. Found a place at last with beautiful water—but no grass for the mules—one of the mules fell into the brook in the night—great trouble to get out. Carrier and Eedle camped alone. Lord Walsingham and Cater gone back to Geysers—are to pick us up today if possible. 23. V. 71 (Tu.).

did. If the pony slipped, no chance. I walked and drove my pony before me the greater part of the way. A good evening's work at collecting.

Camp 5. Head of Dry Creek. 24. V. 1871. Mendocino Co., California. Went on today to Camp No. 5 on the same Dry Creek as No. 3—near the head of it on the road from Cloverdale to Mendocino. *Adela* . . . took 2 or 3 on way and at camp.

24. V. 71. (W.). Caught large snake.

Camp 6. Small river (west of Divide—? running into Navarro River). South Mendocino Co. Cal. 25. V. 1871. On again, a short march after a long morning's setting. Reached a camp (Camp 6) on a small river running towards the Pacific showing that we crossed the divide. Under the edge of the big trees (*Taxodium semper-virens* [*Sequoia*])—a bad collecting camp. Saw a skunk—heeled a stone at him—didn't he stink! Saw a very large red and black woodpecker.

25. V. 71. (Th.). Camped beside river—Creek (dry).

Camp 7. Rancheria Creek (Navarro River). Mendocino Co. 26. V. 1871. On again to Camp 7 on Navarro River—15 miles march—rough road. Lots of quail, hares, and tracks of deer. Several humming birds, shot three. Saw black and white kingfisher. Beautiful collecting ground, but wet weather, and only took 2 *Arctiæ*, one or two *Plumes* and some few odds and ends.

Camp 8. In redwoods near Navarro River. Mendocino Co., Cal. 27-28. V. 1871. Marched on right into the big redwoods (*Taxodium semper-virens*) enormous trees about 180 feet high I guess, miles and miles of this. Camp in middle of redwoods where we are about 13 miles from the forest end and from the coast.

27-28. V. 71. (S.-S.). Camped in the middle of large forest—14 miles to go before we get out tomorrow—no moths to be caught—frogs very noisy.

28. V. 1871. Whit Sunday!

Stopped in camp—a most uncomfortable camp on side of hill. No birds except humming birds and no insects to speak of.

28. V. 71. Whit Sunday. Could not travel—very heavy rain. Very large trees. Guide rode his horse into one tree which was hollow and turned around—thought we had lost him! Expect to reach the Pacific Ocean at Mendocino.

Camp 9. Clearing in redwoods near Navarro River. Mendocino Co., Cal. 29. V. 1871. Shot three humming birds. On towards Mendocino. Went out for deer early—saw a hind and calf—no shot. Road fearfully bad and hilly, slow progress, reached within three miles of coast and camped at a log clearing. Saw a big tree cut. Caught a small ————?? *Cerostoma* sp. white—smaller than the last species ghost moth—6 spms.

29. V. 71. (M.). Started for Mendocino—got stuck fast with waggon and mules—had to wait till Lord Walsingham and Cater came to help out. Still in forest—large tree on fire.

Camp 10. Mouth of Albion River. Mendocino Co., Cal. 30-31. V. 1871.

30 V. 1871. Marched to Albion River and camped at mouth. Cold, most disappointing country, very few insects and chiefly European species. Lots of different flowers on side hill.

30. V. 71. (Tu.). Mouth of Albion River. Very large tree falling.

31. V. 1871. Camp again same place.

31. V. 71. (W.). Camp close to Pacific Ocean—7 miles from Mendocino City—stayed two nights—large number of Indians on roadside.

Camp 11. One mile south of Mendocino City. Mendocino Co., Cal. 1-2. VI. 1871. 1. VI. 1871. Moved towards Mendocino—camped a mile south of it. 2. VI. 1871. Shot a sea-lion on outlying rocks; had to swim over with a rope to tug him ashore—boiling down oil for lamps and skinning sea-lion made us camp here again. *Cirisium*? (=761 larvæ notes No. 20). (=761 S) bred a *Cirisium Bucculatrix*. (=7660 S) bred some *Bucculatrix* from evergreen oak near Petaluma. D. Evergreen oak nr. Santa Rosa. 18. V. 71. excl. 2. VI. 1871.

1-2. VI. 71. (Th.-F.). One mile south of Mendocino City. Lord Walsingham shot large sea-lion. Carrier swam out to rock some distance off to get him. Made a great deal of oil for lamp from sea-lion.

- Camp 12. North of Mendocino City (close to town). Mendocino Co., Cal. 3-5. VI. 1871.
3. VI. 1871. Moved to camp 12 on the north side of Mendocino, close to town. Boiling down bones of sea-lion for skeleton.
4. VI. 1871. Same camp (12)—saw three bears—no rifle!
5. VI. 1871. Same camp (12)—went after bears—found them but got no shot.
- Camp 13. South of Noyo River (near deserted hut in woods) 10 mi. from Mendocino City—in forest. Mendocino Co.
6. VI. 1871. On to Camp 13 near deserted hut in woods. Woods on fire—much smoke—trees falling at distance.
- Camp 14. North Fork of Big River = Rio Grande. Mendocino Co.
7. VI. 1871. On to Camp 14, on head of Big River. Shot a water ouzel.
- Camp 15. Head of Noyo River (5 miles south of Little Lake [near Willits]. Mendocino Co., Cal. 8-11. VI. 1871. On to Camp 15 on ridge of hill 5 miles south of Little Lake. Saw two deer—good collecting ground, several new species.
9. VI. 1871. Same camp (15)—hunt.
10. VI. 1871. Same camp (15)—hunt with Frost and Spanish George. Lots of good moths.
11. VI. 1871. Same camp (15)—shot two deer. Collected some mines taking up the whole plant on which they were..., bred... (genus?) on June 17th. Collected and set at this camp 400 specimens many new.
- Camp 16. Little Lake road—past Little Lake.
12. VI. 1871. Took several moths. (*Coleophora* sp.) two
- 3-5. VI. 1871. (S.-S.). North of Mendocino City (close to town).
3. VI. 1871 (S.). Finished making oil (3 gallons) from sea-lion—packed up and travelled through Mendocino City. Found nice camp and stayed over Sunday.
- 4-5. VI. 71. (S.-M.). Sunday very nice day. Monday same place—very warm.
6. VI. 71. (Tu.). 10 miles from Mendocino—in forest.
7. VI. 71. (W.)—head Big River.
8. VI. 71. (Th.). 5 miles from Little Lake on top of mountain. Saw deer—had long way to go for water—one spring dried up—Lord Walsingham caught a great many moths.
9. VI. 71. (F.). Very hot day. Camp same place.
10. VI. 71. (S.). Still very hot. Same place.
11. VI. 71. (S.). Lord Walsingham shot two small deer—dogs and men had good chase.
12. VI. 71. (M.). Four miles from Little Lake—found pretty snake and a nice camp—not much water.

sorts on dandelion and sunflower plants. Cocoons (long white) of *Tortrix* on some plants. Cocoon of *Cerostoma* on blue flower. Mines of larvæ on dandelion.

- Camp 17. 13. VI. 1871. Camp No. 17. Short of Potter's Valley (above Potter's Valley) [Potter Valley].
- Camp 18. 14. VI. 1871. Camp No. 18. Cold Creek Cañon—Potter's Valley.
- Camp 19. Blue Lake. 15-16. VI. 1871. Bred *Lithocolletes*. Bred *Depressaria* . . . (lost).
- Camp 20. 17. VI. 1871. On to Camp 20, Scott's Valley—5 miles north of Clear Lake—fair collecting camp—some wet ground and much dry. One small rattlesnake. Ants innumerable—many hares.
19. VI. 1871. Camp No. 20. Found bird, skins all, or nearly all, spoilt by maggots—fat on arsenical soap! Moral—use alum and thoroughly dry skins before. This has been a very good collecting camp.
- Camp 21. Lakeport. 20. VI. 1871. on to camp 21. Lakeport. No moths. Several nice birds—one nest of shrike—9 eggs of tortoise.
- Camp 22. Uncle Sam Mountain [Mount Konocti]. 21. VI. 1871. On to Camp 22—half way to Lower Lake—Uncle Sam Mt. No moths.
- Camp 23. Lower Lake (Cash Creek) [Cache Creek]. 22. VI. 1871. Fish in Cash Creek. 23. VI. 1871. Camp 23—caught 4 nice fish (largest about 4 lbs.) probably allied to Barbel—*grandis*? [Sucker]
13. VI. 71. (Tu.). Cold Creek Canyon—three miles from Potter's Valley.
14. VI. 71. (W.). Potter's Vale [Potter Valley]—caught small trout—had them for breakfast on Thursday. Travelled through beautiful valley to Blue Lake.
- 15-17. VI. 71. (Th.-S.). Same place.
18. VI. 71. (S.). Scott's Valley.
19. VI. 71. (M.). Same place. Carrier caught beautiful snake, brown and white. Very hot. Lord Walsingham caught a great many moths. A pleasant Sunday was spent by all.
20. VI. 71. (Tu.). Clear Lake.
21. VI. 71 (W.). Travelled through Lake Port—got provisions to last till arrive at next place, which probably will be Fort Crook. Weather very hot. Uncle Sam Mountain. Carrier very ill.
- 22-23. VI. 71. (Th.-F.). Cash Creek.

- Camp 24. South-west Colusa Co. North Fork Cache Creek. 24-25-VI. 1871.
24. VI. 71. (S.). North Fork Cash Creek. No moths on wing.
25. VI. 71. (S.). Same place—close to Indian's grave, where one was burned and buried. Carrier picked up some beads which were burned with the Indian.
- Camp 25. Phip's Place. 26. VI. 1871.
26. VI. 71. (M.). Camp not known.
- Camp 26. Bear Valley [South-western Colusa County]. 27. VI. 1871.
27. VI. 71. (Tu.). Bare [Bear] Valley.
- Camp 27. Three miles from Indian Valley.
28. VI. 71. (W.). Three miles from Indian Valley.
- Camp 28. Deserted Ranch (S. of South Fork of Stony Creek). 29. VI. 1871.
29. VI. 71. Indian Valley [Indian Valley crosses the boundary between Lake and Colusa counties near the middle].
- Camp 29. South Fork of Stony Creek. 30. VI.-3. VII. 1871.
30. VI. 71. (F.). Stony Creek.
1. VII. 71. (S) Same place. Some very nice fish caught.
2. VII. 71. (S.) Same place.
3. VII. 71. (M.). Same place. Carrier very ill—burnt very much by sun.
- Camp 30. Near South Fork of Stony Creek. 4. VII. 1871.
4. VII. 71. (Tu.) North Fork of Stony Creek.
- Camp 31. Newville. 5. VII. 1871. [Newville was located on the boundary between Colusa—now Glenn and Tehama counties.]
5. VII. 71. (W.). Newwall [Newville]—found camp late at night.
- Camp 32. North Fork of Stony Creek. 6-7. VII. 1871.
6. VII. 71. (Th.). Main and North Fork of Stony Creek.
- Camp 33. Thomas Creek.
7. VII. 71. (F.) Thomas' Creek [Thomas Creek].
- Camp 34. Red Bluff. 8. VII. 1871.
8. VII. 71. (S.). Red Bluff. Lord Walsingham bought Carrier a new hat for 4½ dollars.
- Camp 35. Jelly Ferry.
9. VII. 71. (S.). Jelley's Ferry [Jelly Ferry, across the Sacramento River].
- Camp 36. Millville. 5. VII. 1871.
10. VII. 71. (M.). Millville.
- Camp 37. Cow Springs (=Hummingbird Springs).
- 11-12. VII. 71. (Tu.-W.). Camp not known.

- Camp 38. Cedar Creek. 13. VII. 1871. [Near Silver City]. 13. VII. 71. (Th.). Cedar Creek.
- Camp 39. Hatchet Creek [Fork of Pit River]. 14-17. VII. 1871. 14. VII. 71. (F.). Hatchet Creek. Carrier caught some fine trout. Numbers of moth on wing.
15-16. VII. 71 (S.-S.). Same place. Carrier stung by mosquito in the night—woke up in morning with one eye quite blind—a large rattlesnake killed.
17. VII. 71. (M.). Same place.
- Camp 40. Burney Falls. 18-20. VII. 1871. 18. VII. 71. (Tu.). Burney Creek.
19. VII. 71. (W.). Same place. Lord Walsingham caught large salmon. Carrier caught some trout. Baked some bread in frying pan which was rather heavy—all of us were well filled out after dinner.
20. VII. 71. (Th.).
- Camp 41. Pitt [Pit] River (=Upper Sacramento River). 21-26. VII. 1871. 21. VII. 71. (F.). Pit River—numbers of Indians fishing with spears.
22. VII. 71. (S.). Same place. Some beautiful trout caught by Lord Walsingham.
23. VII. 71. (S.). Same place.
24. VII. 71. (M.). Same place. Cater shot new woodpecker.
25. VII. 71. (Tu.). Same place. Lord Walsingham caught six salmon trout weight about 20 lbs.
26. VII. 71. (W.) Same place.
27. VII. 71. (Th.). Bear Creek. Carrier's birthday.
28. VII. 71. (F.). Same place.
- Camp 42. Bear Creek. 27-28. VII. 1871.
- Camp 43. McCloud's Creek [McCloud River]. 29-30. VII. 1871. 29. VII. 71. (S.). McCloud Creek.
30. VII. 71. (S.). Same place. A man shot in Pit River for stealing horse (day after we left).
- Camp 44. Winchester. 31. VII. 1871; 1. VIII. 1871. 31. VII. 71. (M.). Camp not known—by creek near Chasta [Mt. Shasta].
1. VIII. 71. (Tu). Same place.
- Camp 45. Mt. Shasta (continued here with various out camps for hunting). 2. VIII-1. IX. 1871. [almost a month]. 2. VIII. 71 (W.) Square's Creek [Squaw Creek?]. Close to Chasta Mountain. Mountain covered with snow, 14,440 ft. high.

3. VIII. 71. (Th.). Lord Walsingham and Cater going to hunt today.
4. VIII. 71. (F.). Camp same place. Lord Walsingham shot two deer on Mount Chasta.
5. VIII. 71. (S.). Same place.
6. VIII. 71. (S.). Same place. A very quiet Sunday.
7. VIII. 71. (M.). Same place. Lord Walsingham and Cater gone up Mount Chasta to hunt bear.
8. VIII. 71. (Tu.). Same place—his Lordship still hunting.
9. VIII. 71. (W.). Same place.
10. VIII. 71. (Th.). Same place.
11. VIII. 71. (F.). Same place. Carrier had dinner with shepherd and mountaineer. Good sport shooting quail.
12. VIII. 71. (S.). Same place.
13. VIII. 71. (S.). Same place. His Lordship and Cater came down from mountain and brought in two deer.
- 14-15. VIII. 71. (M.-Tu.). Same place (i.e. Square's [Squaw Creek—close to Mt. Shasta.]
16. VIII. 71. (W.) Cater gone to Beauville for stores. [Berryville?]
17. VIII. 71. (Th.). Lord Walsingham and Eedle gone up Mountain. Carrier left in camp alone one night.
- 18-20. VIII. 71. (F.-S.). Same place.
21. VIII. 71. (M.). Same place. His Lordship and Cater gone to McCleod Creek [McCloud River], to hunt bear.
22. VIII. 71. (Tu.). Same place.
23. VIII. 71. (W.). Same place. Carrier shot hawk.
24. VIII. 71. (Th.). Same place.
25. VIII. 71. (F.). Same place. Lord Walsingham and Cater came in from hunting—his Lordship killed one black bear and one deer.
26. VIII. 71. (S.). Same place.
27. VIII. 71. (S.). Three hunters and two Indians came to supper. Cater very ill.
28. VIII. 71. (M.). His Lordship and Eedle gone up Mount Chasta with three hunters to hunt bears.

29. VIII. 71. (Tu.). Carrier very ill.
30. VIII. 71. (W.). Same place. Lord Walsingham returned from mountain with two large Bucks.
31. VIII. 71. (Th.). Same place.
1. IX. 71. (F.). Same place. His Lordship and Eedle packed up birds for England.
2. IX. 71. (S.). Left Chasta.
- Camp 46. Ash Creek. 2. IX. 1871. (East slope of Mt. Shasta.)
2. IX. 71. (S.). Ash Creek. Forest on fire. Trees falling in all directions.
- Camp. 47. Sheep Rock [5000 ft.]
3. IX. 1871.
3. IX. 71. (S.). Sheep Rocks. Had to travel some distance before we could get water. Beautiful scenery.
- Camp 48. Little Shasta Creek. [Little Shasta River]. 4-5. IX. 1871.
4. IX. 71. (M.). Little Chasta Creek.
5. IX. 71. (Tu.). Cater came home with stores.
- Camp 49. Bull's Meadows [Balls' Meadows]. 6-7. IX. 1871.
6. IX. 71. (W.). Bull's Meadow. Pretty camp with plenty of grass for the cattle. A gray fox killed.
7. IX. 71. (Th.). Same place.
- Camp 50. Muddy Lake. 8. IX. 1871.
8. IX. 1871. (F.). Butte Lake Valley. [Butte Creek Valley].
- Camp 51. Alkali Lake. 9. IX. 1871.
9. IX. 1871. (S.). Hot Creek. Great many ducks shot and one goose.
- Camp 52. Willow Creek. 10-11. IX. 1871.
10. IX. 1871. (S.). Willow Creek—plenty of wild ducks shot.
11. IX. 1871. (M.). Willow Creek.
- Camp 53. Lower Klamath Lake—broke down. 12-15. IX. 1871.
12. IX. 1871. (Tu.). Same place. [Willow Creek]. Carrier caught 22 trout.
- Camp 54.
13. IX. 1871. (W.). Little Clamworth Lake [Little or Lower Klamath Lake]. Saw bull fight in the morning. Our waggon broke down. Saw hot springs.
14. IX. 1871. (Th.). Same place. Lord Walsingham killed Pea and other wild fowls on Lake.
15. IX. 1871. (F.). Same place. Cater came back with axle-tree for waggon.

TRIP THROUGH OREGON

Lord Walsingham extended his explorations northward into Oregon where he was occupied chiefly in hunting during the period of September 16, 1871, to June 17, 1872.

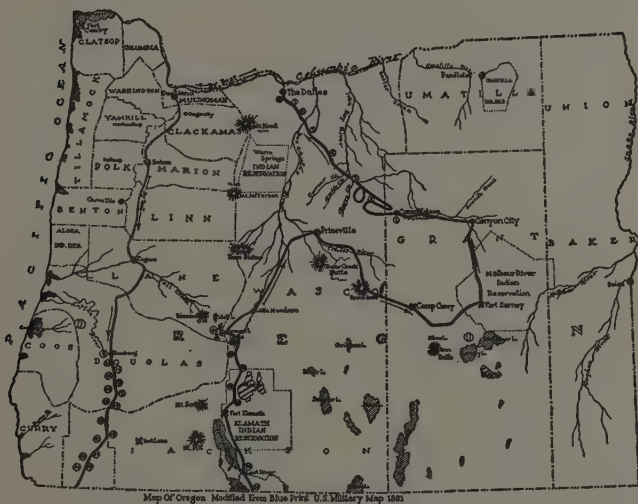


Figure 2. Itinerary of the Walsingham party in Oregon, 1871-1872.

Excepting for the map and the few remarks by Carrier, information concerning the trip through Oregon is not available at this time. I suspect that more data was prepared, but it was apparently not brought to my attention. It is hoped that such information as may be procurable will be presented at a later date. On examining the map it will be seen that the series of camp numbers terminates with 61 just north of Summit Lake in south-eastern Lane County or the extreme northwestern part of Klamath County. Here the old road turned abruptly east for a short distance and joined the road which may now be U. S. Highway 97 through Little Meadows and then turns off east to Princeville and up the Crooked River soon taking a southeasterly route by Round Butte and through Camp Curry, Harney Lake Valley, and on to Fort Harney. From here the route lay north to Canyon

City and thence northwest through Fort Watson [Camp Watson], Bridge Creek, Cherry Creek, Currant Creek, Antelope Creek, across the Deschutes River [Deschutes Bridge] to The Dalles. The camps from Summit Lake to Camp Watson are not numbered and only a few are indicated but beginning with Camp Watson as Camp 1, eight camps are indicated on the journey down to the Dalles. From here the trip to Portland was made by boat. The journey south from Portland was by rail to what appears on the map to be Eugene or a point slightly south. Camp 9 may have been set up at Roseburg or vicinity and from there the route followed U. S. Highway 99 to Grants Pass and from there it was over the old mountain road to Crescent City, California.

CARRIER'S DIARY

Camp 55. 16. IX. 1871 (S.). Lost River. His Lordship caught fish for supper. Seven Indians came into camp on horses—stayed in camp sometime—one with ring in his nose.

17. IX. 1871. (S.). Same place. Indian Chief called "Captain Jack" came into camp with other Indians—stayed sometime. His Lordship talked with Chief. Many ducks killed.

Camp 56. 18. IX. 1871. (M.). Link River—hot springs. A duck was cooked in hot springs. Carrier washed up dinner things with water from springs.

Camp 57. 19. IX. 1871. (Tu.). Upper Clamworth Lake [Upper Klamath Lake]. Forest on fire close by.

Camp 58. 20. IX. 1871. (W.). Clamworth Lake [Klamath Lake]—great many Indians.

Camp 59. 21. IX. 1871 (Th.). Crooked Creek.

22. IX. 1871. (F.). Same place. His Lordship caught fine trout.

23. IX. 1871. (F.). Same place. Beaver killed.

24. IX. 1871. (S.). Same place. Carrier caught 18 large trout.

Camp 60. 25. IX. 1871 (M.). Had to empty wagon to get up sand hill—travelled by moonlight in forest. Carrier got fixed on tree with wagon. 12 o'clock at night when we struck camp. His Lordship and hunters had lighted fire and gone to sheep camp.

THE RETURN TRIP THROUGH CALIFORNIA

The return trip to California was made by way of the wagon route³ from Grants Pass, Oregon, to Crescent City and Eureka, California. On this return trip the camps were renumbered beginning with Camp 9 at what appears on the map to be either Eugene or a point south of that city in Oregon.

³The author traversed this route by automobile in July, 1909, and found it extremely rough going and in some places almost impassable.

CARRIER'S DIARY

- Camp 26. 17. VI. 1872 (M.). Taylors—on top of the Siskiyou Mountains. Lost one mule. [Near the Oregon-California boundary.]
- Camp 27. 18. VI. 1872. (Tu.). Haltville. Still in mountains.
- Camp 28. 19-21. VI. 1872. (W.-F.). Crescent City.
- Camp 29. 22. VI. 1872. (S.). Six miles from Clamworth [Klamath] River.
- Camp 30. 23. VI. 1872. (S.). Mouth of Clamworth [Klamath] River.
24. VI. 1872. (M.). Horses had to swim river. Lord Walsingham killed black bear.
- Camp 31. 25. VI. 1872. (Tu.) Gold Bluff in sea.
- Camp 32. 26. VI. 1872. (W.). On high hill—lost our trail.
- Camp 33. 27. VI. 1872. (Th.). Eight miles from Trinidad.
- Camp 34. 28. VI. 1872. (F.). Mad River.
- Camp 35. 29. VI. 1872. (S.). Acada [Arcata].
- Camp 36. 30. VI. 1872. (S.). Eureka
1. VII. 1872. (M.). Came in town. Camp broken up. Humboldt Bay. Lord Walsingham gone to hunt Grizzly. Carrier left in Town Eureka.
- 2-10. VII. 1872. (Tu.-W.). —————.
11. VII. 1872. (Th.). Left Eureka by Ship Pelican.
12. VII. 1872. (F.). Arrived at Grand Hotel, San Francisco. Homeward bound to England.

[End of Carrier's Diary]

DAILY ALTA CALIFORNIA, San Francisco, vol. XXIV, Friday morning, July 13, 1872.

"Str. Pelican—arrived from Eureka, July 12—26 hours."

Passenger list included Lord Walsingham, Geo. Cator, and A. Carrier.

SOME OBSERVATIONS AND CAPTURES OF CALIFORNIA LEPIDOPTERA

BY J. W. TILDEN AND G. S. MANSFIELD

San Jose State College, California

Several interesting species of Lepidoptera were taken by the writers in eastern San Luis Obispo County, about ten miles west of Simmler, on March 20-22, 1940.

California juniper (*Juniperus californicus* Carr.) is the principal tree in the region. The juniper hairstreak (*Mitoura siva juniperaria* Comst.) was fairly common on these trees, and about twenty specimens were taken. Since juniper is known to occur north along the inner Coast Range, it seems possible that the range of this butterfly may eventually be found to coincide with that of its food plant.

Two specimens of *Euproserpinus phæton* G. and R. were taken. One was found about noon, feeding from the blossoms of a small white composite. The other was taken under unusual circumstances. It was found at night while we were searching for night insects with a Coleman lantern. It was resting on the sand in a dry wash, near a white composite of the same species as that from which the other specimen had been taken. It was entirely inactive, with its wings folded over its abdomen. V. L. Clemence of Atascadero has taken this species in considerable numbers near that town.

Two specimens of *Xanthrothrix neumogoeni* Hy. Edw. were taken, flying in the heat of the day around the flowers of a bright yellow composite. On the basis of available specimens, this species would appear to be rather scarce. There is a specimen in the collection of the California Academy of Sciences at San Francisco, which was taken in Southern California, much farther south than San Luis Obispo County.

Philotes sonorensis F. and F. has been taken on several occasions in Alum Rock Park, Santa Clara County, California. Arthur and Edgar Smith first noticed the occurrence, and called it to our attention in 1939. A single female was taken there in March, 1939, by Tilden. In 1940, two males and one female were taken by Tilden and Mansfield, and two others were seen. The presence of both sexes suggests that the species is established and breeding in that locality. The northernmost record previously known to us is Fremont Peak in San Benito County (Strohbein and Dodge, 1931). It has been taken near the Pinnacles National Monument. Its locality of greatest abundance is in the southern part of the State.

Pieris sisymbrii Bdv. breeds in small numbers in the foothills of the Mt. Hamilton Range, and has been taken in Alum Rock Park by Arthur and Edgar Smith and by the writers.

This is another insect of the more arid parts of the State that pushes north and west along the Mt. Hamilton Range.

(To be continued in next number)

NOTES ON THE DISTRIBUTION AND HABITS OF REDUVIID
VECTORS OF CHAGAS' DISEASE IN THE
SOUTHWEST UNITED STATES

(Hemiptera, Reduviidæ)

BY SHERWIN F. WOOD

Los Angeles City College

(Continued from page 94)

Paratriatoma hirsuta Barber

Uninfected localities: Alvarado Mine, near Congress Junction, Yavapai County, Arizona; Palms to Pines Highway, 1000 feet elevation, near Cathedral City, Riverside County, California; and Tahquitz Canyon, near Palm Springs, Riverside County.

Eleven *Paratriatoma hirsuta* were collected from nests of wood rats (*Neotoma* spp.). All were negative. There were 5 males, 3 females, 1 large and 1 medium nymph collected in California with Dr. R. L. Usinger and one male was collected in Arizona by the writer. This male lived four days in captivity.

HABITAT OF CONE-NOSED BUGS

The nests of *Neotoma fuscipes macrotis* Thomas in California where bugs infected with *Trypanosoma cruzi* Chagas have been collected were in chaparral near, at, or around the base of bushes and trees. They were large cone-shaped or dome-shaped heaps of dead sticks and twigs intermixed frequently with green cuttings and leaves of buckthorn, holly-leaf cherry, poison oak, sumac, holly, or wild buckwheat. There were several exits or entrances and a number of runways in each nest. There was at least one nest site well within the structure where finely shredded plant material was placed to form a protective cup in which the rat slept. The small and medium-sized nymphs of *Triatoma protracta* (Uhler) were usually found in this inner nest material or near it. The large nymphs were usually found on twigs or sticks near the grass nest. The adults were among the sticks and twigs anywhere in the dark parts of the nest and not usually in the grass inner nest material.

In the Quemado Valley, Texas, infected *Triatoma gerstæckeri* Stål were found in a wood rat nest under a mesquite stump. The grass nest material was about two feet below the ground level directly beneath the main mass of the stump and well protected by the branching roots. Some twigs, dried cactus pads, and

cow chips were piled around the base of the stump covering the runways. The runways were dug up, the stump uprooted and the bugs taken from its undersurface where they were clinging to exposed roots. Other nests were mostly in pricklypear cactus (*Opuntia* spp.). They consisted of a few twigs, cow chips, horse dung or dried *Opuntia* pads with or without rocks and dirt, piled up around, over, or among the branches of these large, flat-stemmed cacti. They were very inconspicuous until one was close to the cactus. There were runways through the nest and into the ground and when rats were found during summer collecting they were usually in these underground burrows. One infected nymph of *Triatoma protracta woodi* Usinger was found in a cactus nest in the Quemado Valley.

Near the Chisos Mountains and 13 miles east of Marathon, Texas, infected *Triatoma protracta woodi* Usinger were collected from nests built in cactus and small-leaved sumac, *Rhus microphylla* Engelm.* The structures above ground were piles of twigs and cow chips built around the base of the sumac. The rat's runways extended from these surface structures to underground tunnels. There were grass inner nests in the structures above ground as well as in the tunnels beneath the ground. Bugs were found crawling along the walls of these tunnels and in some localities where the ground was very dry, the bugs escaped by retreating into large cracks along the walls of these tunnels.

Naturally infected *Triatoma protracta* (Uhler) were found in rat nests near Tyrone, New Mexico. Here, the above ground structures consisted of piles of dead cane cactus stems or cow chips or both, sometimes mixed with a few twigs, built at or around the base of a cane cactus. Due to the open type of growth of this cactus, these nests were very conspicuous and easy to search for bugs. In most cases, there were underground runways connected with these nests and bugs were collected not only from nest material above ground but also from the walls of the runways.

At the Alvarado Mine in Arizona, one infected nymph of *Triatoma rubida* (Uhler) was collected in a nest of *Neotoma albigula albigula* Hartley built in a pricklypear (*Opuntia* sp.) cactus. This nest consisted of sticks, twigs, and dried *Opuntia* pads piled around the base of the cactus. There were underground tunnels connected to runways through the nest structure on the surface of the ground.

*Identification by Dr. Omer E. Sperry, Sul Ross State Teachers' College, Alpine, Texas.

NEW LOCALITY AND VECTOR RECORDS

The writer has reported here for the first time two new localities for the recovery of *Trypanosoma cruzi* Chagas in Texas. Naturally infected bugs were obtained from houses 25 miles northwest of Hondo, Medina County (Bandera Strain in *Triatoma gerstaeckeri*), and in Sanderson, Terrell County (Sanderson Strain in *T. rubida*). Both *Peromyscus californicus insignis* Rhoads and albino *Mus musculus* Linnaeus have been infected with the Bandera Strain and the Sanderson Strain. In Experiment 75 (*Peromyscus*, Bandera Strain), leishmaniform *T. cruzi* was found in tissue impression smears of heart muscle and leg muscle made on the 20th day after intramuscular (gastrocnemius) inoculation. Typical blood forms of *T. cruzi* have been demonstrated in experimental infections with the Sanderson Strain. Both strains have been transferred through mice and back into laboratory-raised, trypanosome-free *Triatoma* nymphs.

A new vector for *Trypanosoma cruzi* is here reported from Arizona and California. Three negative female *Paratriatoma hirsuta* were fed on Experiment 75 (Bandera Strain). All three were found infected 10 days after feeding, showing numerous crithidias in their fecal deposits. When examined 21 days after feeding, numerous trypanoform and crithidial stages were demonstrable. A white mouse (Exp. 87) inoculated with feces of the experimentally infected *Paratriatoma* showed typical *T. cruzi* in its blood 14 days after inoculation.

DISCUSSION

The total number of cone-nosed bugs collected or received from southwestern United States was 2,716. Of these, 1,754 were examined for *Trypanosoma cruzi* Chagas and 232 or 13.22% were found infected. The heaviest infection in any locality examined by the writer was 37.50% for 152 specimens of *Triatoma protracta* from Eaton Canyon, California, as compared with 92% for 100 specimens of *Triatoma gerstaeckeri* reported by Packchianian (1939) from near Three Rivers, Texas. Of 1,402 cone-nosed bugs examined by Mazzotti (1940) from Mexico, 392 or 27.96% were infected. The heaviest infection detected by him was in 70 specimens of *Rhodnius prolixus* when 81.42% were found infected. Records for 451 wood rat nests examined by the writer in the southwest show that 1,303 cone-nosed bugs were collected, an average of 2.88 bugs per nest.

The collections of *Triatoma* from houses and wood rat nests at the Alvarado Mine, Arizona, would seem to indicate a yearly

cycle for the species found there, namely, *rubida*, *protracta*, *protracta woodi*, and *longipes*. As reported previously (Wood, 1941a), the adults were found in houses from about May 15 to September 15 and then not seen again until the next year. Evidently the nymphs winter over in the rat nests and complete metamorphosis the following summer. In 1939, 15 rat nests examined August 12 and 13 yielded 102 *Triatoma* of which there were 6 adults, and 21 large, 66 medium, and 9 small nymphs. In 1940, 17 rat nests were examined May 30, 31. Of the 17 *Triatoma* collected, there were 12 adults, and 3 large and 2 small nymphs. Therefore, the best time of year for collecting nymphs at the Alvarado Mine would seem to be the fall.

SUMMARY

1. Five different *Triatoma* (*protracta*, *protracta woodi*, *rubida*, *longipes*, *gerstaeckeri*) have been found naturally infected with *Trypanosoma cruzi* in the United States.
2. A new vector from Arizona and California, *Paratriatoma hirsuta*, has been experimentally infected with *cruzi*.
3. Two new Texas localities are reported for *Trypanosoma cruzi*.
4. Notes on the longevity, habits, and occurrence in wood rat nests of the various cone-nosed bugs are recorded.

BIBLIOGRAPHY

- Kofoed, C. A. and F. Donat. 1933. South American Trypanosomiasis of the Human Type—Occurrence in Mammals in the United States. Calif. and West. Med., 38:1-12, 5 figs. in text.
- Mazzotti, L. 1940. Triatomideos de Mexico y su infeccion natural por *Trypanosoma cruzi* Chagas. Medicina, 20:95-109, 2 pls.
- Packchianian, A. 1939. Natural infection of *Triatoma gerstaeckeri* with *Trypanosoma cruzi* in Texas. U. S. Public Health Reports, 54:1547-1554, 10 pls.
- Usinger, R. L. 1939. Descriptions of New Triatominae with a Key to Genera. Univ. Calif. Publ. Ento., 7:33-55, 1 pl.
- Wood, F. D. 1934. Natural and Experimental Infection of *Triatoma protracta* Uhler and Mammals in California with American Human Trypanosomiasis. Am. Jour. Trop. Med., 14:497-512, 3 pls.
- Wood, S. F. 1941a. New localities for *Trypanosoma cruzi* Chagas in Southwestern United States. Am. Jour. Hyg. (In Press).
- 1941b. A Method of Collecting and Transporting Cone-nosed Bugs. Bull. Brooklyn Ent. Soc., 36:137-139, 1 fig.
- Wood, F. D. and S. F. Wood. 1938. On the Distribution of *Trypanosoma cruzi* Chagas in the Southwestern United States. Am. Jour. Trop. Med., 18:207-212, 1 fig. in text.

A SYNOPSIS OF THE GENUS TRACHUSA WITH NOTES
ON THE NESTING HABITS OF *T. PERDITA*
(Hymenoptera, Megachilidae)

BY CHARLES D. MICHENER

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The genus *Trachusa* Panzer¹ is represented by but three properly authenticated species, one from Eurasia, one from California, and one from Arizona. The additional names (all of Old World species) included in *Trachusa* have been long unrecognized, and are probably either synonyms of the well-known *T. byssina* or representatives of other genera, as indicated in part by Friese (1911).

Considering their widely discontinuous distribution, the three species of *Trachusa* are remarkably similar, as indicated in the following generic description.

Moderate sized, robust bees. Females almost entirely black, males with clypeus and sides of face cream-color or yellow, the lateral face marks truncate below level of antennæ; pubescence pale, rather abundant, often forming feeble bands on abdominal tergites; outer faces of the rather broad tibiae clothed, especially apically, with characteristic, regularly placed, short, robust hairs; punctuation of head and thorax, except clypeus and supraclypeal area, fine and dense; head narrower than thorax, short anteriorly; antennal bases considerably nearer to anterior ocellus than to anterior margin of clypeus; inner margins of eyes feebly converging below or subparallel; buccal fossa deep, margined by hypostomal carinæ; labrum longer than broad, subrectangular; cheeks about as broad as eye; mandibles stout, especially in females, those of male tridentate, of female with an apical tooth, followed by a notch, followed by a feeble rounded tooth which grades into a long, nearly straight edge which terminates in the strong inner apical angle; trophi rather short; labial palpi considerably shorter than glossa, first segment slightly shorter than second; maxillary palpi five segmented, second and third segments longest; thorax high; notalices linear; angle between anterior and lateral faces of mesepisternum strong; metanotum vertical, enclosure of propodeum nearly so and large; arolium present; claws of male cleft, of female with large, median, internal tooth; wings, brownish; abdomen rather short and strongly convex above, first tergite bearing a broad basal concavity; sternites two to five of female with a scopa; abdomen of male with seven exposed tergites and

¹ The name *Trachusa* Panzer is here used on the assumption that the "Erlangen list" will be disregarded. As pointed out by Morice and Durrant (Trans. Ent. Soc. London, 1914: 426, 427), *Stelis* becomes a synonym of *Trachusa* Jurine, and *Diphyis* Lepeletier must be used in place of *Trachusa* Panzer, if the "Erlangen list" is accepted.

six exposed sternites, seventh and eighth sternites concealed above sixth; male genitalia with cardo broadest ventrally, reduced to a narrow ribbon dorsally; coxopodites broadest basally, bearing ventrally, near bases, the volsellæ; parameres slightly exceeding coxopodites, not united by a sclerotic bridge.

KEY TO THE SPECIES OF TRACHUSA

Males

1. Mandibles largely yellow; sixth and seventh tergites simple, without subapical folds or ridges.....*byssina*
- Mandibles black; sixth tergite with transverse subapical keel or carina, seventh with a variously modified subapical fold.....2
2. Sixth tergite with posterior margin evenly rounded; mandible with distance from end of apical tooth to end of second tooth greater than distance between apices of second and third teeth*perdita*
- Sixth tergite with posterior margin produced and subtruncate medially; mandible with distance from end of apical tooth to end of second tooth less than distance between ends of second and third teeth.....*manni*

Females

1. Sixth tergite simple.....*byssina*
- Sixth tergite with strong basal elevation, separated by vertical or overhanging fold from produced, flange-like margin....*perdita*

TRACHUSA BYSSINA (Panzer)

Apis byssina Panzer, 1798, Faun. Ins. German., 5:56.

Trachusa serratulæ Panzer, 1805, Faun. Ins. German., 8:86.

Megachile resinana Schilling, 1829, Ubers. Arbeit. schles. Ges. f. vaterl. Cultur, i, J, p. 75.

?*Diphysis Pyrenaica* Lepeletier, 1841, Hist. Nat. Ins., Hymen., 2:308, female and male.

Megachile rotundiventris Perris, 1852, Ann. Soc. Linn. Lyon, 1:196, male and female.

Trachusa serratulæ var. *seitzi* Cockerell, 1925, Entom., 58:158, ♂.

Male: Mandibles largely yellow, apex of median tooth equidistant between apices of other two teeth; facial markings yellow; face not elevated along line of upper margin of clypeus; stigma longer than broad; second recurrent vein meeting or basad to second transverse cubital; posterior basitarsi broadest medially; enclosure of propodeum impunctate or only narrowly punctate above; posterior margins of tergites feebly depressed; sixth tergite with posterior margin furnished with a broad, rounded, apical flange medially; seventh tergite feebly and broadly emarginate apically, not carinate; third sternite with posterior margin concave medially and margined by long hairs; fourth and fifth sternites also

emarginate medially on posterior margins; sixth sternite with two, broad, apical, lateral lobes, separated by a broad, truncated emargination, each of the lobes furnished with a shining, impunctate, longitudinal ridge which extends nearly to the base of the exposed portion of the sternite; genital coxopodites greatly broadened basally, slender and simple apically; parameres not meeting basally, converging apically. Length 10 to 11 mm.

Female: Similar to male except for the usual sexual characters; clypeus with two or three denticles on each side of middle; fifth and sixth tergites simple. Length about 11 mm.

Among specimens before me from Germany and Austria, several different combinations of the slight venational characters upon which the variety *seitzii* is based are presented. This species has an extensive range from the Pyrenees eastward through central Europe and far into Asia.

Several of the works referred to in the preceding synonymy have not been available to me.

TRACHUSA MANNI Crawford

Trachusa manni Crawford, 1917, Proc. Ent. Soc. Wash., 19:167 ♂.

Male: Mandibles black, apical tooth slender and curved, its tip closer to tip of median tooth than latter is to tip of third tooth; facial marks lemon yellow; clypeus without transverse ridge at upper margin and without longitudinal median, impunctate ridge; second recurrent vein interstitial with second transverse cubital; enclosure of propodeum with broad, punctate band above; posterior margin of sixth tergite with median, produced, subtruncate, apical flange as broad as the median interruption in the subapical, strongly raised carina, which curves anteriorly at the sides, this carina not provided with a median, apically directed, projection; seventh tergite with longitudinal median carina basally, and a strong subapical fold, which is greatly produced laterally near the apex as a broad lobe on each side, forming a wide, deep, median emargination in what appears to be the posterior margin of the tergite; true posterior margin of tergite slightly beneath this fold, and with a shallow median emargination as broad as the emargination in the subapical fold; apical portions of third, fourth, and fifth sternites densely pubescent, apical margin of sixth with a subtriangular, median projection. Length 14 mm.

The type specimen is in the United States National Museum. This species is known only from the two original specimens from Ramsey Canyon, Huachuca Mountains, Arizona. Since I have not seen this species, the preceding descriptive comments have been taken from Crawford's paper and from notes on the type sent by Miss Grace A. Sandhouse.

TRACHUSA PERDITA Cockerell

Trachusa perdita Ckil., 1904 Bull. So. Calif. Acad. Sci., 3:159 ♂.

Male: Mandibles black, apical tooth rather broad, its tip farther from tip of second tooth than the latter is from third; facial markings cream color; face elevated along line of upper margin of clypeus, and clypeus with a longitudinal, median, impunctate ridge; stigma of fore wings broader than long; second recurrent vein distad to second transverse cubitus; enclosure of propodeum with broad, punctate band above; posterior basitarsi slender and parallel sided; posterior margins of abdominal tergites strongly and abruptly depressed; sixth tergite with posterior margin broadly rounded, the entire margin (instead of median part only as in other species) produced as a flange which is delimited basally by the subapical, transverse, feebly nodulose keel, which curves anteriorly at the sides and gives off medially a short, subtriangular projection or keel toward the posterior margin of the segment; seventh tergite with longitudinal median ridge basally, and a subapical transverse fold which is not greatly produced and which might appear to be the apical margin of the segment only laterally, because the median and most strongly elevated portion of the fold is strongly arched anteriorly so that it is, at the midpoint, nearer to the base of the exposed portion of the tergite than to the apex; area distad to and enclosed in the arch of the fold smooth, depressed, and brown; posterior margin of seventh tergite narrowly and rather feebly emarginate medially; third and fourth sternites with margins slightly produced posteriorly in the middle, not provided with long hairs; fifth sternite similar but with weak, median emargination in produced portion; sixth sternite broad, feebly three lobed at apex, lateral lobes low and subtruncate, at extreme sides of sternite; median lobe more elevated, exceeding lateral lobes, truncate, and furnished with a pair of large, strongly anteriorly directed teeth at its apex which form a U-shaped emargination; seventh and eighth sternites heavily sclerotized, seventh with posterior margin furnished with a broad, V-shaped median emargination, eighth rather elongate, broadened posteriorly to the trilobate apex, median lobe longer and broader than lateral lobes, its apex slightly emarginate; genital coxopodites not much broadened basally as seen from above, apically with small, blunt, external tooth and transverse subapical ridge; parameres contiguous (but not fused) in basal halves, slender and widely separated apically. Length 11 to nearly 13 mm.

Female: Black, with whitish pubescence, forming bands on posterior margins of abdominal tergites one to five. Head, except for clypeus and supraclypeal area, finely and closely punctate; clypeus and supraclypeal area rather coarsely punctate, the region of the suture separating these sclerites, and the median longitudinal line of the clypeus somewhat elevated and not punctate, although dull; anterior margin of clypeus with about eight or nine

small denticulations; hypostomal carinae more strongly elevated than in *byssina*; enclosure of propodeum punctured above, impunctate but minutely tessellate below (punctate band broader than in *byssina*); abdominal tergites rather similar to those of male in punctuation, with posterior margins conspicuously and rather abruptly depressed and more closely punctate than rest of tergites, these depressed margins broader than in the male; fifth tergite with posterior margin feebly and broadly emarginate medially; sixth tergite with large, median, basal, strongly and abruptly elevated area, produced medially and apically to a small, overhanging point; posterior margin of sixth tergite produced medially as a broad, rounded, horizontal shelf or flange; ventral scopa long and dense. Length nearly 13 mm.

Neallotype, female, No. 4845, Calif. Acad. Sci., Ent., Hastings Natural History Reservation, near Jamesburg, Santa Lucia Mountains, Monterey County, California, 1800 feet elevation, June 14, 1938, on *Brodiaea ixiodes* (C. D. Michener). The type specimen is from Tehachapi, California, and is in the American Museum of Natural History, New York City.

Although apparently rare, this bee proves to be rather widely distributed in southern and central California, as indicated by the following additional localities: The Gavilan, Riverside County, May 31, 1937, on *Pentstemon antirrhinoides* (P. H. Timberlake); Santa Barbara, May 7, 1936, on morning glory (I. McCracken).

The female of this species, previously known only from the unique male type, is here described for the first time.

On June 14, 1938, at the Hastings Natural History Reservation, I had the opportunity to observe briefly the habits of *Trachusa perdita*. About a dozen nests were found, all in the ground on one hillside (the only place on the Reservation where any individuals of this species were seen). There was a tendency toward grouping of the holes, all those seen being disposed in groups of two to four, the individual holes of a group being from eight inches to two feet apart. They were in loose, somewhat sandy soil, the surface of which sloped in a southerly or westerly direction at an angle of 20° or 30° from horizontal. No turrets or piles of earth marked the entrances, which were left open and unguarded when the females left to visit flowers. The holes were about ten mm. in horizontal diameter, slightly less in vertical diameter, and slanted downward throughout their courses at angles of 20° to 30° from the horizontal. In the five nests which

were opened, the tunnels, which were five or six inches long, bent strongly to one side in a broad curve, which, in one case placed the bottom of the tunnel almost directly beneath its entrance.

The cells were placed end to end in the lower part of the tunnel, and were rather firmly glued together, so that an entire series of them could be removed unbroken. The intercellular partitions were thin, there being no thick resinous plugs, such as those shown by Hachfeld (1926) for *T. byssina*, between cells. Outside dimensions of the cells averaged 16 mm. in length by 10 mm. in diameter. Cells were made from irregular pieces, commonly two or three times as long as broad, cut from the serrate margins of the thick leaves of the shrub, *Rhamnus crocea*, which grew nearby. These pieces were arranged with their long axes at right angles to the long axes of the cells, and cemented together to form firm walls by means of a gum which was sticky at the time of excavation but became very hard after a few months in a vial. Although this gum burned vigorously, seemingly with the odor of pine pitch, there were no conifers within two miles of the nesting site. It caused adherence of numerous small pebbles and particles of sand to the outside of the cells. Although possibly carried in by the insects, these objects were in all probability *in situ* in the soil.

One nest excavated contained a single incomplete cell, half full of a stiff, sticky, brown substance, the pollen of *Brodiaea ixiodes*, which was the flower visited chiefly by these bees at this locality. Other nests were more nearly complete, the one with the largest number of cells having, however, but four. The uppermost cell of this nest was incomplete and unprovisioned, in the process of being built, but the others contained fully grown larvæ, which had consumed all of their food. This suggests that the process of nest building and provisioning is slow, although that of larval development may be rapid.

A number of cells were placed in vials, and opened from time to time during the next year. The fully grown larvæ eventually enclosed themselves in tough, brown, parchment-like cocoons, and remained thus, as prepupæ, throughout most of the winter. In early June, 1939, one passed through a brief pupal state and emerged as an adult, cutting an opening through the side of its cell, but the few others still alive remained as prepupæ within their cocoons, and would have emerged the following summer, perhaps, had they not been killed.

The cocoons were similar to those of *Osmia*, with a large, solid, well formed nipple in the middle of a deep concavity or chamber at the anterior end. This cavity was formed by a thin sheet extending anteriorly from the side walls of the cocoon along the inner surface of the cell. Hachfeld shows this chamber closed in *T. byssina*, but states that the sheet which forms it is easily broken. Such may be the case in the cocoons before me, in all of which the chamber is broadly open anteriorly. Laterally, the sheet which forms the anterior cavity is supported by several, thin, rather irregular lamellæ connecting it with the anterior end of the cocoon proper. This is quite a different structure from the three, regularly placed, concentric rows of supporting strands, not confined to the lateral parts of the chamber, described and figured for *T. byssina* by Hachfeld.

As may be seen from the preceding notes on *Trachusa perdit*a, its habits differ considerably from those of *T. byssina*, which have been described in some detail by several European authors. The latter species, according to Friese (1911, 1923), nests in groups of as many as forty or fifty females, and the tunnels do not have the unusual shape described for those of our species, but may be branched. However, as in *T. perdit*a, the cells are made of pieces of leaves, stuck together by gum (in the case of *T. byssina* at least, pitch from pine).

ACKNOWLEDGMENTS

I wish to express my appreciation to the late Mr. E. P. Van Duzee for the use of specimens in the collection of the California Academy of Sciences, to Mr. P. H. Timberlake for specimens from his collection, to Miss Grace A. Sandhouse for important notes on the type of *Trachusa manni*, and particularly to Dr. J. M. Linsdale for the opportunity to take advantage of the facilities of the Frances Simes Hastings Natural History Reservation of the University of California.

REFERENCES

- Friese, H. 1911. Apidæ I, Megachilinæ, Das Tierreich, 28:xxvii+440, 132 fig.
- Friese, H. 1923. Die europäischen Bienen, Gruyter & Co., Berlin u. Leipzig, vii+456 pp., 33 Taf. 100 fig.
- Hachfeld, G. 1926. Zur Biologie der *Trachusa byssina* Pz. (Hym., Apid., Megach.), Zeitschr. f. wissenschaft. Insektenbiol., 21: 63-84, 1 Taf., 8 fig.

NOTES ON CANTHARIS (Coleoptera, Cantharidæ)

BY DOROTHY FENDER

McMinnville, Oregon

In the early stages of a revisional study of the genus *Cantharis* in which the author is now engaged, a new species very near *Cantharis carolinus* Fabr. was discovered mixed with the older species. It is very likely that this species has been confused with *carolinus* for many years, as was the case with *C. neglectus* Fall.

Neglectus in spite of its close resemblance to *carolinus*, is not closely related to it. The new species herein described and *carolinus* form a group by themselves, which, in the opinion of the author, must properly be considered as representing a distinct genus. This opinion is based on the enormous development of the basal portions of the male genital armature, these being so strongly developed as to envelope most of the remainder of the structure, a condition not paralleled elsewhere in the family. It is the present intention only to describe the new species and leave the problem of the generic status of this group for treatment in the larger paper in preparation. A redescription of *C. carolinus* is herein also presented as an aid in recognizing the new species.

CANTHARIS CAROLINUS Fabr.

Black, pubescence golden. Head black, sides of clypeus and a narrow frontal stripe testaceous (this maculation might also be described as two piceous stripes between the antennæ); rather finely, distantly punctate, the surface rather polished; occiput smooth and convex. Eyes small, about one-fourth the length of head in the male, less than one-fourth the length of head and widely separated in the female. Antennæ stout, laterally compressed, sub serrate, those of the female relatively more slender and shorter. Thorax subquadrate, moderately transverse, more so in female; front angles rounded, hind angles sub-acute; front margin evenly, shallowly arcuate, hind margin subsinuate; testaceous, with a discal black area which is wider at base than apex, the margins of this area smooth, not interrupted by the testaceous as in *bilobatus* and *neglectus*; smooth, shining, with fine scattered punctures bearing the fine, rather long, golden pubescence. Tarsi stout, all segments broad and lobed. Claws with a long basal tooth making them appear cleft (fig. 1). Ventral segments black, sides and median area of apex of each segment often narrowly testaceous. Male genital armature with the dorsal plate shallowly emarginate, ventral hooks simple (fig. 3). Length: Male: overall 11.5 mm.;

elytra 8.2 mm.; antennæ 8 mm. Female overall 13 mm.; elytra 9 mm.; antennæ 7 mm. Width: Male elytra 3.5 mm.; thorax 2.75 mm. Female elytra 4 mm.; thorax 3.5 mm.

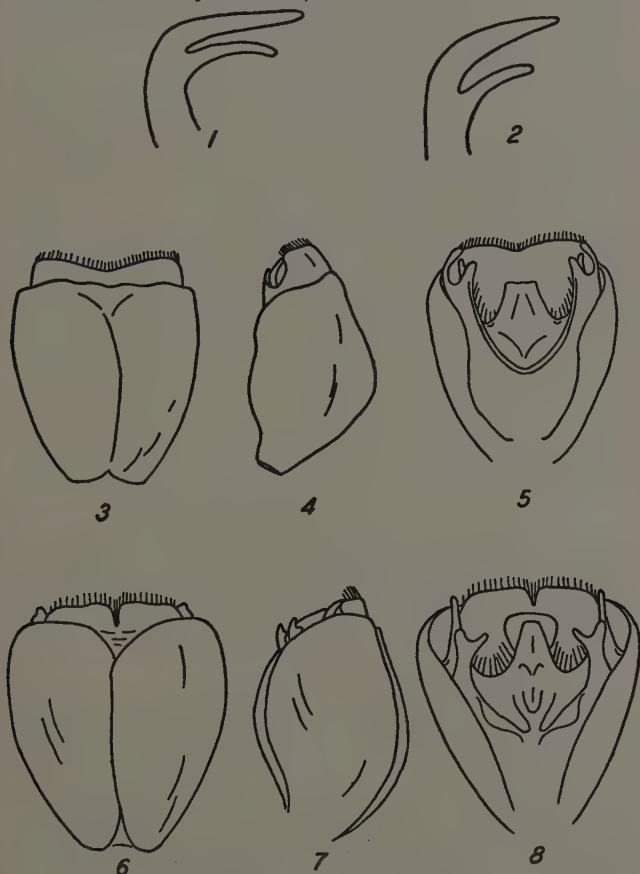


Figure 1, unguis formation of *Cantharis carolinus* Fabr.; 2, same of *lobatus*, n. sp.; 3, 4, and 5, dorsal, lateral, and ventral views, respectively, of male genital armature of *carolinus*; 6, 7, and 8, dorsal, lateral, and ventral views, respectively, of *lobatus*, n. sp.

The color phase *C. jactatus* Say differs only in paler pigmentation.

Two hundred specimens examined. Distributional extremes are represented by Maine, Ontario and Minnesota on the north and Key West, Florida to Texas on the south.

Cantharis bilobatus Fender, new species

Piceous, or brunneo-piceous, pubescence cinereous. Head piceous except for a pale area at base of antennæ extending forward to side margins of clypeus, leaving frons dark, this a solid dark area in most specimens. In some specimens there is a paler area directly between the antennæ, and in the pale forms this dark frontal area is split into two stripes. Punctuation rather close, moderately deep, confused, rather coarse, surface rather dull; occiput impressed, not convex. Eyes large, nearly one-half the length of head in the male, about one-fourth the length of head in the female. Antennæ slender, sub-cylindrical, segments a little shorter in the female. Thorax subquadrate, slightly narrowed anteriorly; relatively longer and less transverse, that of female more transverse but less so than in *carolinus*; pale with piceous maculation, this as in *carolinus* except that the yellow part intrudes into the external portion of the base, thus forming two piceous basal lobes on each side. Tarsi slender, nearly cylindrical (at least in dried specimens). Claws as in *carolinus* except that the tips of the two parts are more distant (fig. 2). Ventral segments of male piceous, margined with dark testaceous at sides and except for sixth at apex, this testaceous portion broadest on the median line. Female uniformly piceous beneath. Male genital armature: dorsal plate deeply cleft on the median line, ventral hooks bilobed (fig. 6). Measurements: Length: Male overall 10 mm.; elytra 8 mm.; antennæ 5.5 mm. Female overall 10.5 mm.; elytra 8.5 mm.; antennæ 5.5 mm. Width: Male elytra 3 mm.; thorax 2 mm. Female elytra 3.75 mm.; thorax 2.5 mm. The two specimens from Ontario are smaller; male and female measuring 8 and 9.5 mm. in length respectively.

In some specimens the normally piceous areas are dark testaceous or brunneous and the frontal stripe is divided as in *carolinus*. This represents a color phase corresponding to *C. carolinus jactatus* Say.

Holotype, male, Hennepin County, Minn., collected by C. W. Oestlund. Allotype, female, Douglas County, Minn., June 14, 1937, collected by F. C. Fisk. Specimens examined, 8 males and 10 females. Iowa: Sioux City, June 23, 1925 (C. N. Ainslie). Minnesota: Crookston, July 12, 1935, and July 3, 1939; Houston County, May 24, 1937 (P. M. Schroeder), and June 16, 1910; Itaska Park, July 3, 1939; two specimens, Shakopee, June 10, 1922 (C. E. Mickel); La Crescent, June 16, 1925 (C. B. Philip); two specimens, Ottertail County, Otto Lugger collection. North Carolina: Lake Waccaman, April 14, 1904 (F. S. Sherman); Wallace, April 6, 1904 (F. S. Sherman). New Mexico: Otto Lugger collection. (This record seems anomalous). Ontario:

Prince Edward County, July 14, 1929; Rainy River District, July 22, 1924 (J. F. Brimley).

Perhaps the easiest character for differentiating this species when mixed with *carolinus* material is the lobular form of the basal portion of the piceous pronotal maculation. *Neglectus*, which also has the basal portion of the pronotal maculation interrupted, differs in the pale part entering only on the median line whereas this species, while some of the testaceous may interrupt the base at the center, always has the lateral portion interrupted. Rarely, paler *carolinus* specimens may show a breaking up of the basal portion of the pronotal maculation, but there is not the definite lobe which we find in this species. This pronotal character, if supported by the more slender form, slender antennæ and tarsi, more divaricate unguis teeth, and large eyes, makes identification simple, even without the aid of genitalic dissections.

DESCRIPTIONS OF TWO NEW SPECIES OF WATER
BEETLES OF THE GENUS HYDROPORUS
FROM CALIFORNIA¹
(Coleoptera, Dytiscidæ)

BY HUGH B. LEECH

Vernon, British Columbia

***Hydroporus rossi* Leech, new species**

A dark species belonging to the *vilis* group of Fall's "A Revision of the North American species of *Hydroporus* and *Agaporus*" (1923); last abdominal sternite of female produced at apex.

Female. Length 3.66 mm., width 2.01 mm. Form rather broadly ovate, only slightly convex; dorsal surface finely alutaceous, ventral more shining. Head piceous; pronotum piceous, narrowly paler along lateral margins; elytra dark reddish-brown, narrowly piceous along suture and lateral margins; metasternum and metacoxal plates piceous, abdominal sternites dark reddish-brown; first four antennal segments, legs, and tip of last sternite reddish-brown, outer antennal segments tinged with piceous.

Head two-thirds as wide as pronotum, surface finely alutaceous, finely sparsely punctate. Pronotum widest at base, basal margin bisinuate; surface finely reticulate, finely sparsely punctate, punctures twice as large as those of head, an anterior transverse series

¹ Contribution No. 2050, Division of Entomology, Science Service, Department of Agriculture, Ottawa, Ontario.

coarser and closer; lateral marginal bead two-thirds as wide as terminal antennal segment. *Elytra* finely reticulate, finely sparsely punctate, especially at sides; punctures a little coarser than those of pronotum, separated by several times their own widths. *Metacoxal* plates finely alutaceous, more finely sparsely punctate than pronotum; metasternal wings and first two abdominal sternites laterally slightly more coarsely punctate than elytra; last abdominal sternite a little produced at apex. First three protarsal segments two-thirds width of protibia, claws simple.

Male. Very similar to female. Last abdominal sternite not produced at apex; pro- and mesotarsi a little wider; anterior protarsal claws slightly thicker and more bent than their fellows. Male genitalia: see figures 1-3.

Holotype, female, No. 4976, and allotype, male, No. 4977, Calif. Acad. Sci., Ent., Pigmy Forest, Fort Bragg, Mendocino County, California, May 5, 1938, E. S. Ross, collector.

Paratypes, eleven females, four males, all same data as holotype. Distributed as follows: one pair, Canadian National Collection; one female each to the British Museum (Nat. Hist.), United States National Museum, Museum of Comparative Zoology, and Mr. J. B. Wallis; the remainder in my collection. The smallest paratype, a female, is 3.30 mm. in length; the series is remarkably uniform in punctuation; several specimens are teneral, and hence their elytra and abdominal sternites are paler in color.

Hydroporus rossi is most closely allied to *pacificus* Fall, to which species the females run in his key. *H. pacificus* is smaller (2.6—3 mm.), more coarsely punctate, much less broadly ovate, paler in color, and occurs in Alaska and British Columbia.

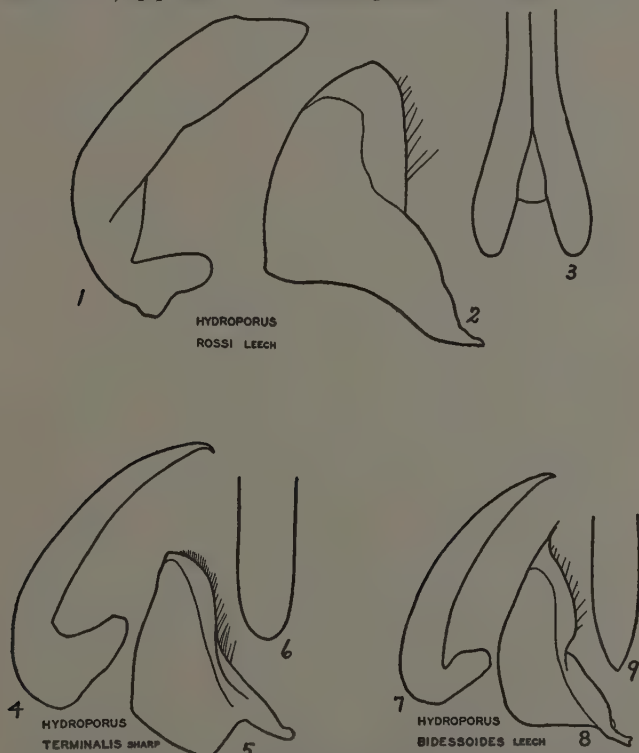
In describing the produced apex of the last abdominal sternite in *pacificus*, Fall remarked that he had not determined the sex of the three specimens before him, and that the character might possibly be sexual. I have at hand a series of *pacificus* from British Columbia, several examples of which were verified by the late Dr. Fall. It is quite easy to show, by dissection, that all specimens having the last ventral produced are females.

Hydroporus bidessoides Leech, new species

A small dark brown species, with coarsely punctate elytra; resembles a large *Bidessus*, at first glance.

Male. Length 2.22 mm., width 1.11 mm. Form rather evenly oval, narrower posteriorly than anteriorly; moderately convex, finely alutaceous dorsally, more shining ventrally. Head dark red-

dish-brown, anterior margin narrowly paler; pronotum reddish-brown, lateral marginal bead paler; elytra dark reddish-brown, vaguely paler laterally. Legs and first four antennal segments pale reddish-brown, outer seven antennal segments piceous. Body beneath black, epipleura and metacoxal processes reddish.



Figs. 1-3, male genitalia of *Hydroporus rossi* Leech: 1. Profile of aedeagus; 2. Paramere, lateral view; 3. Apex of aedeagus, dorsal view. Figs. 4-6, *Hydroporus terminalis* Sharp, same. Figs. 7-9, *Hydroporus bidessoides*, Leech, same.

Head slightly more than two-thirds width of pronotum, reticulate, finely sparsely punctate. *Pronotum* widest at base, one-third broader than long, surface reticulate, finely sparsely punctate, except for anterior and posterior transverse series of coarser punctures; lateral marginal beads broad, as wide as outer antennal segments; basal line of pronotum not sinuate between hind angles and median prolongation. *Elytra* more finely reticulate than head or pronotum, coarsely punctate, the punctures separated by from one to three times their own diameters; a few finer punctures inter-

mixed. *Metacoxal* plates reticulated, punctures about as coarse as those of elytra; abdominal sternites more shining, sparsely punctate; apical sternite slightly flattened medially. Male genitalia: see figures 7-9. First three segments of pro- and mesotarsi moderately dilated, tarsal claws simple.

Female. Very similar to male, but darker; pro- and mesotarsi narrower. Length 2.25 mm., width 1.14 mm.

Holotype, male, No. 4978, allotype, female, No. 4979, Calif. Acad. Sci., Ent., Caspar, Mendocino County, California, December 16, 1939, J. R. Helfer, collector.

Paratypes, twenty-two males, twenty-seven females, same data as holotype. One female, Caspar, Mendocino County, California, January 20, 1936 (J. R. Helfer). All specimens were taken in a small pool. The paratypes vary in length from 2.19 to 2.40 mm.; the elytral punctation is finer in some specimens, than in the type. Paratypes will be distributed as follows: four males, four females to Mr. J. R. Helfer of Caspar, California; one pair each to: the Canadian National Collection, the British Museum (Nat. Hist.), the United States National Museum, the Museum of Comparative Zoology, and Messrs. J. B. Wallis, F. N. Young and Ralph Hopping; the remainder in my collection.

In addition to the above types, four males and three females are before me; they are too damaged or too teneral to be designated as paratypes.

Hydroporus bidessoides is most closely allied to *H. terminalis* Sharp, to which it runs in Fall's key. I have a good series of Californian *terminalis* including two homeotypes compared by Mr. J. Balfour-Browne of the British Museum; as contrasted with *bidessoides*, Sharp's species is larger (2.55—2.88 mm.), more finely punctate, more attenuated posteriorly, flatter, and has slightly narrower lateral pronotal margins; in addition the median lobe of the male genitalia is differently shaped—compare figures 6 and 9.

The ædeagi of the species of Fall's *vilis* group of *Hydroporus* are very distinctive: all known to me are bifid apically, a character which I have not observed elsewhere in the genus, and which may well be definitive of the group. If this latter supposition is correct, then *terminalis* and *bidessoides* will have to be removed from this assemblage, for the ædeagus is simple in both species. However, I have not as yet observed an external character upon which to make this separation; the species *barbaræ* Fall and *browni* Wallis recently described as allied to *terminalis*, are unknown to me in nature.

THREE NEW ELATERIDÆ FROM THE PACIFIC
NORTHWEST
(Coleoptera)

BY M. C. LANE

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Walla Walla, Washington*

This paper contains descriptions of three new species of Elateridæ belonging to the genus *Limoni*us.

*Limoni*us *rufihumeralis* Lane, new species

Male. Length 8.8-12.0 mm., width 2.4-3.3 mm. Elongate parallel, convex; body, antennæ, and legs deep black, except humeral angles of elytra, which are reddish orange; surface moderately shiny, with very short, erect, gray vestiture, becoming somewhat longer, decumbent, and whitish on abdomen and legs.

Head quadrate, coarsely, umbilicately punctured; frons broadly triangularly concave; clypeal margin entire, arcuate or slightly emarginate when viewed from above; antennæ extending by one to two segments beyond posterior angles of pronotum, second and third segments small, only slightly longer than wide, similar in shape and size, the two together nearly as long as fourth, which is triangular, sixth segment slightly longer than wide, fourth to tenth slightly serrate.

Pronotum one-sixth longer than wide, widest across posterior angles, sides nearly straight, parallel in posterior third, thence narrowing very slightly to anterior angles, which are very slightly explanate; posterior angles produced, obtusely angulate on outside, with a short, fine carina not reaching margin; disc convex to side margins in middle, which are hidden from above, median line canaliculate at basal third; surface densely, deeply, and coarsely punctate on summit, punctures becoming larger and umbilicate toward margins, separated by much less than their own diameters. Scutellum prominent, flat, finely, densely punctate, more densely pubescent than rest of body.

Elytra one-tenth wider than pronotum, about two and one-half times as long as wide, the sides straight and parallel to apical third, evenly arcuate to apices, which are bluntly rounded; orange color covering entire humeral region and base of each elytron, the inner margin of color sharply defined, extending backward for a short distance along second or third interval, there gradually sloping outward to lateral margin near hind coxal plate, and extending faintly along lateral margin to apical third; striæ well defined, moderately coarsely, deeply punctate, the intervals very slightly convex, with three irregular rows of fine punctures.

Proplura densely umbilicately punctured; sternopleural plate excavated and flared in front, grooved one-third to one-half dis-

tance to procoxæ; posterior margin of propleura deeply notched, usually with a blunt tooth in notch; produced hind angles rectangular. Prosternum umbilicately punctured, the punctures more sparsely spaced than on propleura, mucro concave between procoxæ. Metasternum and abdomen moderately densely, finely punctate; last abdominal segment slightly emarginate and depressed on sides, with distinct pattern arrangement of vestiture around these depressions; also with brushes of longer hairs extending from margin between side marginations and apex. *Ædeagus* as figured.

Female. Length 10.5–13.4 mm. Width 2.9–3.8 mm. Differs from male in being on the average only slightly broader and more robust, with antennæ barely reaching to posterior angles of pronotum; last abdominal segment without marginal brushes of long hair, but with vestiture pattern, emargination, and depression as in male, though somewhat reduced.

Type locality—Slopes of Blue Mountains near Walla Walla, Washington.

Type, allotype, and paratype—Catalogue No. 54845, United States National Museum. Paratypes in the collection of the California Academy of Sciences, in the Canadian National Collection, in the Museum of Comparative Zoology, and in the collections of the Academy of Natural Sciences of Philadelphia, Ohio State University, Montana State College, Utah State College, Idaho University, Washington State College, M. C. Lane, H. P. Lanchester, M. H. Hatch, K. E. Gibson, E. W. Jones, and J. H. Baker. Described from 126 males and 72 females, from the following localities: Washington—Walla Walla, April 21 to May 21, 2000 to 3000 feet (Lane, Lanchester, Jones, Gibson); Mount Spokane, June 22, 6000 feet (Lane, Gibson); Buckeye (Hopkins), Kamiak Butte, Palouse, May 20 (Lane, Gibson); Pullman, April 11 to June 6 (Piper, Melander, Bales, Westall, Eide, Eiffert, Burke, Hedberg); Godman Springs, Blue Mountains, June 25, 6000 feet (Lanchester, Jones). Idaho—Moscow, May 1 to June 30 (Clarke, Brindley, Rice, Wakeland, Shull, Aldrich, Yothers, Riddel); Viola, May 24 (Gibson); White Bird, May 23 (Lanchester); Cœur d'Alene, May 7 to 24 (Evenden, Rust). Oregon—Tollgate Road, Blue Mountains, May 27 to June 12, 3000 feet (Lanchester); Milton, June 10 (Jones); Meacham, May 9 to 22 (Lane, Lanchester); Wallowa Lake, May 27 to July 3, 4500 feet (Lane); Baker, Pine Creek, May 12 to 30, 4000 feet (Baker, Lane); Whitman National Forest, Blue Mountains, June 12, 5000 feet (Lane, Lanchester, Baker). Montana—Bozeman, May 18 to June 27; Gallatin County, May 23, 1900, 4800 feet (Cooley); Yellowstone Park,

June 26 to July 19 (Robinson, Melander); Lake County, May 13 (Eichmann); Menard, June 17 (Kohls); Jefferson County, June 23; Florence, June 3; Lolo, May 15. Utah—Logan, May 8 (Knowlton). Canada—Calgary, June 1 (Bryant).

The large series of paratypes is quite uniform in size and color, the humeral orange area showing only very slight variations in shape and extent.

This species has been confused for years with *crotchii* Horn but is distinct from it in distribution as well as in many other characters. The new *rufihumeralis* is easily distinguished from *crotchii* and other black *Limonius* with red humeral angles on the elytra by the genitalia and characters of the last abdominal segment. In *crotchii* the last abdominal segment has evenly rounded margins and regular vestiture.

Limonius rufihumeralis is not uncommon in the yellow pine-shrub association of the Blue Mountains of Washington and Oregon and the Bitter Root Mountains of Idaho, its range extending into Montana and Utah, and north to Alberta.

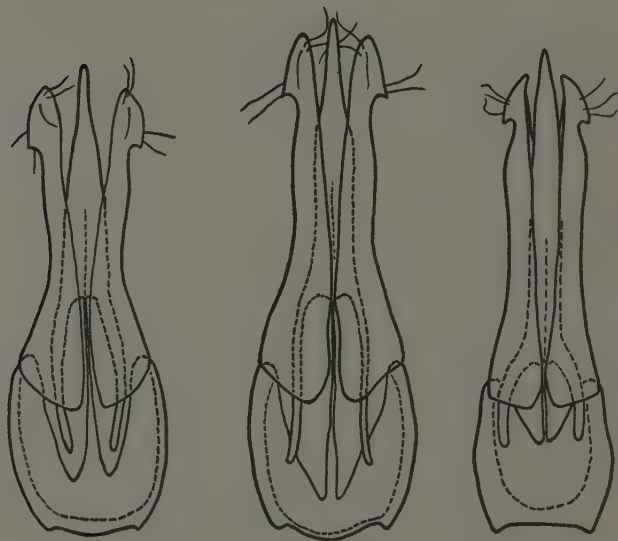
The first specimen under *Limonius crotchii* Horn in the LeConte collection at the Museum of Comparative Zoology at Cambridge, Mass., is a female of *rufihumeralis* from Utah. The second specimen in the LeConte collection is a true *L. crotchii* Horn from Oregon. There is also a female of *rufihumeralis* from Pullman, Wash. (W. B. Mann) in the Blanchard collection at Cambridge. There is a specimen of *rufihumeralis* labeled Seattle, Wash., in the Canadian National Collection at Ottawa, which is probably wrongly labeled, as this species has never been found west of the Cascade Mountains in Washington by the author or his correspondents after years of extensive collecting in that region.

Limonius lanchesteri Lane, new species

Male. Length 9.2 mm., width 2.5 mm. In form, color, and vestiture similar to *rufihumeralis*, but elytra entirely brownish orange, antennæ and femora piceous to brown, tibiæ and tarsi lighter, abdomen sometimes narrowly margined with orange, and scutellum dark brown.

Head quadrate, coarsely, umbilicately punctured; frons broadly concave above clypeal margin, the latter entire and broadly arcuate; antennæ extending at least by one segment beyond posterior angles of pronotum, second and third segments small, subequal, together as long as triangular fourth, the sixth segment slightly longer than wide, fourth to tenth slightly serrate.

Pronotum one-fifth longer than wide, sides nearly straight, parallel, slightly sinuate before posterior angles, narrowing very little to anterior angles, which are somewhat explanate; posterior angles produced, angulate, finely carinate; disc convex, margins hidden at middle from above, canaliculate at base; surface with coarse, umbilicate punctures set closely on disc, very closely on sides. Scutellum prominent, flat, densely punctate, and pubescent.



LANCHESTERI

RUFIHUMERALIS

HUMIDUS

Fig. 1. Male aedeagi of three new species of *Limonius*.

Elytra slightly wider than pronotum, about two and one-half times as long as wide, sides nearly straight, slightly wider at apical third, gradually arcuate to apices, which are obtusely rounded; striae well defined, coarsely punctate; intervals flat, with two irregular rows of fine punctures.

Propleura with very close, umbilicate punctures; sternopleural plate excavated, flared in front and grooved one-third to one-half distance to procoxae; posterior margin of propleura deeply notched, produced hind angles rectangular. Prosternum with coarse umbilicate punctures, mucro slightly concave between procoxae. Metasternum and abdomen densely, finely punctate; last abdominal segment with side emarginations and vestiture pattern as in *rufihumeralis*. Aedeagus as figured.

Female. Length 12 mm., width 3.3 mm. Differs from male in being longer, broader, and more robust, with antennæ slightly shorter; last abdominal segment with reduced emargination and hairs as in *rufihumeralis*.

Type locality—Rocky Bar, Idaho.

Type and allotype—Catalogue No. 54846, United States National Museum. Paratypes in collections of M. C. Lane and H. P. Lanchester. Described from four males and one female, all collected in the mountainous region of south central Idaho. The type was collected near Rocky Bar, Idaho, 6000 feet altitude, June 7, 1937, by H. P. Lanchester, for whom the species is named. The allotype was collected near Challis, Idaho, June 21, 1930, and a paratype near Atlanta, Idaho, 8600 feet, June 20, 1931, both by Lanchester. Other paratypes were collected near Smith's Ferry, Idaho, June 23, 1938, and Rocky Bar, Idaho, 6000 feet, June 16, 1939, by Lane.

This species is named for Horace P. Lanchester with appreciation of the many pleasant hours of association in the laboratory and the field studying the Elateridæ.

Very little variation is shown in this small series, except in the legs, which vary a little in color. This species is closely related to *rufihumeralis* by its form and abdominal and genital characters. It differs in having the elytra all orange, the scutellum, abdominal margins, and legs lighter, the pronotum longer with coarse umbilicate punctures on the disc, and the anterior angles more explanate. The lobes of the male genitalia are shorter in proportion to the base in *lanchesteri* and the lateral lobes are more arcuate on the outer angles. Extensive collecting over a period of years has failed to show variation of color or other characters which might suggest that these two species are the same. Their distribution apparently does not overlap, and they should be considered distinct from each other, as well as distinct from all other nearly related species in the genus.

Limonius humidus Lane, new species

Male. Length 8.8-10.4 mm., width 2.3-2.8 mm. Elongate parallel, convex; black, except humeral angles of elytra, which are orange; surface shiny with very short dark vestiture above, becoming longer and ashy colored beneath.

Head quadrate, coarsely, deeply punctured; frons only slightly concave; clypeal margin entire, but not strongly so in middle, and nearly truncate when viewed from above; antennæ extending by nearly three segments beyond posterior angles of pronotum; second

and third segments small, globular, similar in shape, subequal, the two together shorter than fourth, which is triangular, sixth segment slightly longer than wide, fourth to tenth serrate, eleventh elongate and slightly thicker than preceding segments.

Pronotum one-sixth longer than wide, widest across posterior angles, sides nearly straight, narrowing anteriorly, slightly sinuate near posterior and anterior angles, the latter definitely explanate; posterior angles produced, angulate, with short, fine carina parallel to margin; disc evenly convex to side margins, which are visible from above, median line evident only basally, surface deeply and coarsely punctate, more densely so toward margins, punctures on disc separated by about their own diameters or less. Scutellum prominent, elongate, convex, densely punctate and pubescent.

Elytra slightly wider than pronotum, about two and one-half times as long as wide, the sides straight and parallel to a little behind middle, evenly arcuate to apices, which are bluntly rounded; orange color covering humeral region sharply defined diagonally from middle of side of scutellum posteriorly to fourth striae, hence slightly anterior to margin of elytron near mesosternal epimeron; striae well defined, coarsely, deeply punctate, the intervals flat with two irregular rows of fine punctures.

Propleura densely, shallowly punctured; sternopleural plate somewhat excavated and flared in front only; posterior margin of propleura deeply notched, produced posterior angles sharply rectangular, inner angle sometimes acute. Prosternum deeply, coarsely punctured, densely so on mucro, which is only slightly concave between procoxae. Metasternum and abdomen finely, densely punctate. *Ædeagus* as figured.

Female. Length 8.9-11.6 mm., width 2.3-3.2 mm. Differs from male in being slightly larger on the average, with antennae reaching only to posterior angles of pronotum, the last segment being noticeably thickened.

Type locality—Forest Grove, Oregon.

Type and allotype—Catalogue No. 54847, United States National Museum. Paratypes in collections of M. C. Lane, M. H. Hatch, H. P. Lanchester, K. M. Fender, and Oregon State College. Described from six males and ten females, all from wet coastal portion of Oregon and Washington. The type and allotype were collected at Forest Grove, Oregon, March 16, 1919, and April 10, 1938; the paratypes were collected at Corvallis, Oregon, March 1 to April 18 (Ferguson, Scullen, Schuh, Starker); Baker Creek, Lincoln County, Oregon, May 10 to 15 (Fender); McMinnville, Oregon, March (Fender); Hood River, Oregon, April 15 (Childs); Electron, Wash., June 11 (W. W. Baker); Seattle, Wash., April 8 to 20 (Hatch).

This series of specimens varies somewhat in size, but very little in form or coloration. The orange color of the humeral angles of the elytra is restricted and more sharply defined than in any similarly colored species of the genus. This species has also been confused with *crotchii* but can easily be separated from that species by its smaller orange area, larger terminal segment of antennæ, explanate anterior angles of pronotum, convex scutellum, and the ædeagus. It differs from *rufihumeralis* by the same characters, and by the regular vestiture and outline of the last abdominal segment.

Limonijs humidus is also related to the eastern *stigma* (Hbst.) (*armus* Say) by color and by the character of the posterior propleural margin and the last antennal segment, but differs by its larger size, more heavily punctate pronotum, and shorter antennæ.

THREE NEW AMERICAN TINGITIDÆ

(Hemiptera)

BY CARL J. DRAKE

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The present paper contains the description of one South American and two North American Tingitidæ. The types have been deposited as indicated under each species.

Teleonemia lutzi Drake, new species

Large, broad, testaceous, with large, prominent, dark-fuscous markings, the antennæ and legs fuscous-black. Head black, with five, short, blunt, testaceous spines, the median porrect and a little longer. Eyes oblique, black. Bucculæ broad, testaceous, darker in front. Rostrum long, extending to end of sulcus, brownish, black at apex; rostral channel deep, wide, becoming a little wider posteriorly, the sides nearly straight, entirely open behind. Antennæ long, shortly pilose; segment I short, slightly longer and stouter than II; III very long, slightly bent, three times as long as IV.

Pronotum strongly convex, pitted, moderately narrowed anteriorly, dark chocolate-brown, the triangular process testaceous; carinæ stout, dark chocolate-brown on disc, becoming testaceous in front and behind, foliaceous, each composed of one row of areolæ; lateral carinæ subparallel, slightly concave within in front; parazonia testaceous, strongly reflexed, narrow, slightly broader in front; mostly uniseriate, indistinctly biseriate in front. Elytra broad, strongly overlapping and jointly rounded behind; costal

area moderately broad, testaceous, mostly biseriate, triseriate in widest part; subcosta area broad, mostly triseriate, testaceous, a large spot a little in front of middle fuscous-black; discoidal area large, not quite reaching middle of elytra, widest slightly beyond middle, narrow at base and apex, mostly fuscous-black, a small triangular area at base and a narrow border at apex testaceous; discoidal area almost entirely clouded with fuscous black. Legs long and slender.

Length, 5.60 mm.; width, 2.65 mm.

Holotype, male, 45 east of Horqueta, Paraguay, named in honor of John C. Lutz, in Drake collection.

This species belongs to the group of *Teleonemia* having a wide costal area. *T. annæ* (Kirk.) and *T. triangularis* (Blanch.) have much wider costal areas.

Teleonemia huachucae Drake, new species

Very similar to *T. schwarzi* Drake, but readily separated from it by the shorter antennæ and legs and especially by the distinctly less convex paranota. Head black, the median and frontal spines much reduced, tubercle-like and dark in color, the hind pair short, appressed and testaceous. Rostrum brownish black, extending to meso-metasternal suture; rostral laminae testaceous, widely separated and cordate on metasternum; antennæ brownish black, short, rather stout, densely and shortly pilose; segment III twice as long as IV.

Pronotum moderately convex, coarsely pitted, fuscous-black, the triangular process becoming testaceous behind, there the areolæ opaque and whitish. Collar raised, areolate, subtruncate in front; paranota very narrow, reflexed, grayish testaceous, indistinctly uniseriate; carinae distinct, each composed of one row of very low, elongate areolæ, the lateral carinae moderately diverging anteriorly. Elytra dark testaceous, with the nervelets considerably infuscated; costal area very narrow, uniseriate, the transverse nervelets dark fuscous, the tibiae distally becoming brownish. Uni-biseriate discoidal area moderately large, widest near middle, there five areolæ deep, the outer margin nearly straight; sutural area more widely reticulated, the nervelets mostly dark fuscous, the areolæ whitish, opaque. Legs moderately short, rather slender, brownish fuscous, the tibiae distally becoming brownish.

Length, 2.65 mm.; width, 1.00 mm.

Holotype, male, and allotype, female, Nos. 5174 and 5175, Calif. Acad. Sci., Ent., and several paratypes, Huachuca Mts., Carr County, Arizona, August 5, 1924, taken by J. O. Martin, in the collection of the California Academy of Sciences.

TELEONEMIA SCHWARZI Drake

Teleonemia schwarzi Drake, Ohio Jour. Sci., XVIII, 1918, p. 326.
Teleonemia sororcula Van Duzee, Calif. Acad. Sci. XII, 1923, p. 142.

T. schwarzi Drake and *T. sororcula* Van D. are identical forms and the former name has priority. Several examples were taken at Palm Springs, California, May 18 and 20, 1917, and July 5, 1924, by E. P. Van Duzee, and May 24, 1940, by R. L. Usinger, these last on *Beloperone californica*. Known only from California and Lower California.

Leptoypha nubilis Drake, new species

Very closely related to *L. drakei* McAtee, but easily separated from it by its broader form, darker color and shorter antennæ. Legs short, yellowish brown, all femora fuscous-black. Antennæ rather short, slightly variable in length, fuscous-black, the apex of third segment pale. Pronotum and elytra dark yellowish brown, considerably marked with fuscous-black more or less covered with whitish exudation, the pubescence very short and golden. Costal area narrow, uniseriate.

Length, 2.20 mm.; width, 0.95 mm.

Holotype, male, and allotype, female, Nos. 5176 and 5177, Calif. Acad. Sci., Ent., and numerous paratypes, Independence, Inyo County, Calif., June 11, 12, and 13, 1929, collected by E. P. Van Duzee and R. L. Usinger on *Ceanothus*.

On account of form, color and markings it seems advisable to treat *nubilis* as a distinct species. More specimens and information concerning its habits may prove that it is not more than a race or variety of *drakei* McAtee.

A REVIEW OF THE GENUS PHYSOCEPHALA OF THE WESTERN UNITED STATES

(Diptera, Conopidæ)

BY GEORGE E. BOHART

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The area in the United States west of the Rocky Mountains apparently contains only two valid species of *Physocephala* Schiner, *P. affinis* (Williston) and *P. burgessi* (Williston). These were the first species described from the West and were placed in the genus *Conops* by Williston who considered the closely allied genera, *Physocephala* and *Conops*, to be identical.

Physocephala texana Williston was recorded from Colorado and Ormsby County, Nevada, by Kröber (1914), but these specimens are not available to American students and the records have not since been corroborated. The several species and subspecies which were described from western material by M. C. Van Duzee (1927, 1934) are all referable to one or the other of the original two species. I have examined the holotypes, most of the other type material, and specimens determined by Mr. Van Duzee and have compared these with long series comprising several hundred specimens of *affinis* and *burgessi* in my collection and in the California Academy of Sciences. When a sufficient number of specimens from any locality is examined, the range of variation clearly includes such variant types as were used to establish the Van Duzee species. In the case of *affinis* this was found to be true in a series of over one hundred specimens bred from a single colony of bembicid wasps.

The characters which Mr. Van Duzee used to distinguish his species, although useful at times as supplementary features or even primary characters when strikingly distinct, are subject to considerable variation among specimens from a single population or even, in the case of antennal measurements, in a single insect depending upon the degree of inflation of the ptilinum or the angle to which the terminal structures are turned upon their axes. Not even subspecific rank can be assigned these names since their ranges are in all cases coincident or one within another.

PHYSOCEPHALA AFFINIS (Williston)

Conops affinis Williston, 1883, Trans. Conn. Acad. Sci. 4:339.

Physocephala affinis, Kröber, 1914, Arch. f. Naturgesch. 50:105.

Physocephala affinis, Van Duzee, 1927, Proc. Calif. Acad. Sci.

(4) 16:579.

Physocephala humeralis Van Duzee, 1927, Proc. Calif. Acad.

Sci. (4) 16:580.

Physocephala humeralis simulans, Van Duzee, 1927, Proc. Calif.

Acad. Sci. (4) 16:581.

Physocephala aurifacies Van Duzee, 1927, Proc. Calif. Acad.

Sci. (4) 16:581.

Physocephala buccalis Van Duzee, 1927, Proc. Calif. Acad. Sci.

(4) 16:582.

Physocephala rubida Van Duzee, 1934, Ann. Ent. Soc. Amer.

27:315.

Physocephala simulans Van Duzee, 1934, Ann. Ent. Soc. Amer.

27:321.

Physocephala affinis may be differentiated structurally from *burgessi* by the following table of measurements. The figures represent averages taken from fourteen specimens of *affinis* and eight of *burgessi*. The measurements of lengths of antennal segments were made from a dorsal view, along the line of greatest length of the second segment. Antennal widths were made for each segment at its widest point. There was found to be no overlapping of comparative figures between the two species except in total length which proved to be a character of general significance only.

TABLE I. STRUCTURAL DIFFERENCES BETWEEN PHYSOCEPHALA AFFINIS (WILLISTON) AND BURGESSI (WILLISTON).

Mesonotum breadth to length <i>burgessi</i>		Mesonotum breadth to length <i>affinis</i>		Total length of insect* <i>burgessi</i>	Total length of insect* <i>affinis</i>
1 : 1.06		1 : 1.24		11.4 mm.	12.2 mm.
Antennal segment	Comparative length to breadth <i>burgessi</i>	Comparative length to breadth <i>affinis</i>	Length proportion- ate to segment 1 <i>burgessi</i>	Length proportion- ate to segment 1 <i>affinis</i>	
1	2 : 1	2.6 : 1	1	1	
2	3.58 : 1	5.25 : 1	3.9	2.9	
3	2.43 : 1	2.25 : 1	2.5	1.6	

*Exclusive of antennæ.

In addition to these structural features, several usually reliable color distinctions are manifested. *Affinis* is paler red than *burgessi*, the former approaching terra cotta in color and the latter dark, brick red. Some specimens of *affinis*, however, are also dark red. *Affinis*, if with dark markings on the mesonotum, has a pair of lateral longitudinal bands as well developed as the median one. *Burgessi*, on the other hand, usually has a single broad, median black band. *Affinis* is more extensively covered with golden pollenose tomentum than *burgessi*.

Affinis is the more abundant of the two species. It ranges throughout the western United States from eastern Washington, east to Wyoming, south to Arizona, and from there west to the Pacific. This area comprises largely the Great Basin and the

State of California. Kröber (1914) recorded a specimen of this species from Michigan but it seems likely that this was a pale colored *sagittaria* Say. There appears to be a slight tendency for the production of smaller, darker forms in the northern extension of the range of *affinis* but even there most of the specimens are typical. In my collection are four specimens from the Owens Valley, California, which are uniformly smaller than the average *affinis* and have slightly shorter third antennal segments. It may be that more extensive collecting in the Great Basin will reveal nameable subspecies.

Affinis is most often encountered in open, semi-desert brush lands at all elevations up to 9000 feet. I have collected it several times in the forested areas of the Sierra but in these instances always in extensive clearings or in sandy areas around large lakes. Its life history has recently been reported upon as a parasite of *Bembix* wasps¹.

PHYSOCEPHALA BURGESSI (Williston)

Conops burgessi Williston, 1883, Trans. Conn. Acad. Sci. 4:340.

Physocephala burgessi, Kröber, 1914, Arch. f. Naturgesch. 80: 106.

Physocephala burgessi, Van Duzee, 1927, Proc. Calif. Acad. Sci. (4) 16:579.

Physocephala brevicornis Van Duzee, 1927, Proc. Calif. Acad. Sci. (4) 16:580.

Although nearly as widespread as *affinis*, this species is less abundant and more scattered in distribution. It occupies the moister regions in the Sierra and Coast Ranges of California, and timbered areas of Oregon, Washington, Idaho, Utah, Wyoming, and Montana. It presents a very uniform appearance throughout its range. Although it may occur in a wooded area bordering open country which harbors *affinis*, the two species are never taken together. This is illustrated in Wyoming where one finds *affinis* in the open brush lands of Jackson Hole and *burgessi* in the forests of the bordering moraines.

The life history of *burgessi* is unknown. I once observed an individual pursuing a large specimen of *Odynerus* wasp but could not find conclusive evidence of parasitism. This fly has been collected on flowers of *Prunus* and *Ceanothus*.

¹ Bohart, G. E. and J. W. MacSwain 1939. The life history of the sand wasp *Bembix occidentalis beutenmuelleri* and its parasites. Bull. South. Calif. Acad. Sci. 38:84-97.